أهلا يا أصدقاء

جمعنا لكم حلول واجبات الماث
ونتعذر اذا فيها اي غلط 💗.

- دعواتكم تكفينا💗.

Chapter 1

1.1

Page:- 6

1. $\{1,2,3,4,5,\ldots,75\}$.

Finite Set

$10 \in \{1,2,3,4,5,\ldots,75\}$

3. $\{x : x$ is a natural number greater than or equal to $10\}$

$= \{10, 11, 12, \ldots\}$

infinit set and 10 is an element.

4. $\{x : x$ is an <u>even</u> natural number$\}$

$= \{2, 4, 6, \ldots\}$

Infinite set and 10 is an element.

20. $\{x : x$ is a natural number greater than $10\} = \{11, 12, 13, \ldots\}$

True.

30. $\{8, 11, 15\} \cap \{8, 11, 19, 20\} = \{8, 11\}$ True

33. $\{3, 5, 9, 10\} \cup \phi = \{3, 5, 9, 10\}$ True

1.2

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11. $\{1, 3\}$

12. $\{0, 1, 3\}$

13. $\{-6, -\frac{12}{4}, 0, 1, \frac{1}{4}, 3\}$

14. $\{-6, -\frac{12}{4}, -\frac{5}{8}, 0, \frac{1}{4}, 1, 3\}$

15. $\{-\sqrt{3}, \sqrt{12}, 2\pi\}$

16. $\{-6, -\frac{12}{4}, -\frac{5}{8}, -\sqrt{3}, 0, \frac{1}{4}, 1, 2\pi, 3, \sqrt{12}\}$

17. $-(2^4) = -(2.2.2.2) = -16$

18. $-(3^5) = -(3.3.3.3.3) = 243$

19. $(-2)^4 = (-2).(-2).(-2).(-2) = 16$

20. $(-2)6 = (-2).(-2).(-2).(-2).(-2).(-2) = 64$

21. $(-3)^5 = (-3).(-3).(-3) = -27$

22. $(-2)^5 = (-2).(-2).(-2).(-2).(-2) = -32$

23. $(-2).\ 3^4 = (-2).(3).(3).(3) = -54$

24. $-4 . 5^3 = (-4).(5).(5).(5) = -500$

(2)

page:- 14

(33). $\frac{-8+(-4)(-6)\div 12}{4-(-3)} = \frac{-8+24\div 12}{4+3}$

$= \frac{-8+2}{7}$

$= \frac{-6}{7}$

(41.) $\frac{5r}{2p-3r}$

$= \frac{5.(-10)}{2.(-4)-3.(-10)}$

$= \frac{-50}{-8+30}$

$= \frac{-50}{22} = -\frac{25}{11}$

(34) $\frac{15\div 5.4\div 6-8}{-6-(-5)-8\div 2} = \frac{3.4\div 6-8}{-6-(-5)-4}$

$= \frac{12\div 6-8}{-6+5-4} = \frac{2-8}{-5}$

$= \frac{-6}{-5} = \frac{6}{5}$

(67) $\frac{3}{8}(\frac{16}{9}y+\frac{32}{27}z-\frac{40}{9})$

$= \frac{3}{8}\cdot\frac{16}{9}y+\frac{3}{8}\cdot\frac{32}{27}z-\frac{3}{8}\cdot\frac{40}{9}$

$= \frac{16}{24}y+\frac{32}{72}z-\frac{40}{24} = \frac{2}{3}y+\frac{4}{9}z-\frac{5}{3}$

$\boxed{1.3}$

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5- $q^3 . q^5 = q^8$

7- $(-3m^4)(6m^2)(-4m^5) = (-3.6.(-4))(m^4.m^2.m^5) = 72m^{11}$

14- $(-2x^5)^5 = -2^5(x^5)^5 = -32x^{25}$

21. $-(\frac{x^3y^5}{z})^0 = -1$

45. $(4r-1)(7r+2) = 4r(7r)+4r(2)+(-1)(7r)+(-1)(2)$

$= 28r^2+8r-7r-2 = 28r^2+r-2$

69. $[(3q+5)-p][(3q+5)+p] = (3q+5)^2 - p^2$

$= 9q^2+30q+25-p^2$

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92. $\dfrac{10x^3+11x^2-2x+3}{5x+3}$

$= 2x^2+x-1+\dfrac{6}{5x+3}$

$$\begin{array}{r|l} & 2x^2+x-1 \\ \hline 5x+3 & 10x^3+11x^2-2x+3 \\ \ominus & 10x^3+6x^2 \\ \hline & 5x^2-2x+3 \\ \ominus & 5x^2+3x \\ \hline & -5x+3 \\ \ominus & -5x-3 \\ \hline & 6 \end{array}$$

93. $\dfrac{x^4+5x^2+5x+27}{x^2+3}$

$= x^2+2+\dfrac{5x+21}{x^2+3}$

$$\begin{array}{r|l} & x^2+2 \\ \hline x^2+0.x+3 & x^4+0x^3+5x^2+5x+27 \\ & x^4+0x^3+3x^2 \\ \hline & 2x^2+5x+27 \\ - & 2x^2+0.x+6 \\ \hline & 5x+21 \end{array}$$

$\boxed{1.4}$ page:- 29

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⑥ $6x(a+b)-4y(a+b) = (a+b)(6x-4y) = 2(a+b)(3x-2y)$

⑪ $15-5m^2-3r^2+m^2r^2 = (15-5m^2)+(-3r^2+m^2r^2) = 5(3-m^2)-r^2(3-m^2)$

$= (3-m^2)(5-r^2)$

⑲ $30a^2+am-m^2$

㉕ (a) $8x^3-27 \longrightarrow$ (B) $(2x-3)(4x^2+6x+9)$

(b) $8x^3+27 \longrightarrow$ (C) $(2x+3)(4x^2-6x+9)$

(c) $27-8x^3 \longrightarrow$ (A) $(3-2x)(9+6x+4x^2)$

㊱ $x^3+8 \longrightarrow$ (C) $(x+2)(x^2-2x+4)$

㊸ $(2y-1)^2-4(2y-1)+4$

$= u^2-4u+4$

$=(u-2)(u-2)$

$=(2y-1-2)(2y-1-2)=(2y-3)(2y-3)$

(47) $b^2+8b+16-a^2 = (b^2+8b+16)-a^2$

$= (b+4)^2 - a^2$

$= (b+4+a)(b+4-a)$

$= (b+a+4)(b-a+4)$

Section 1.5

طالبات
التمريض

1) Find the $\boxed{\text{domain}}$?

$\{x / x+7 \neq 0\}$

$= \{x \in \mathbb{R} / x \neq -7\} = \mathbb{R} \setminus \{-7\}$
$= (-\infty, -7) \cup (-7, \infty)$

$\boxed{3}$ $\dfrac{3}{x^2-5x-6} = \dfrac{3}{(x+1)(x-6)}$

$\{x \in \mathbb{R} / x+1 \neq 0 \text{ and } x-6 \neq 0\}$

$= \{x \in \mathbb{R} / x \neq -1 \text{ and } x \neq 6\}$

$= \mathbb{R} \setminus \{-1, 6\}$

$= (-\infty, -1) \cup (-1, 6) \cup (6, \infty)$

$\boxed{7}$ write in lowest terms

$$\frac{-8(4-y)}{(y+2)(y-4)} = \frac{8\cancel{(y-4)}}{(y+2)\cancel{(y-4)}} = \frac{8}{y+2}$$

(14) find product

$$\frac{y^3+y^2}{7} \cdot \frac{49}{y^4+y^3}$$

$$= \frac{y^2\cancel{(y+1)} \cdot 49}{7 \quad y^3\cancel{(y+1)}} = \frac{49}{7} \cdot \frac{y^2}{y^3}$$

$$= \frac{7}{y}.$$

subtraction

(25) $$\frac{7x+8}{3x+2} - \frac{x+4}{3x+2}$$

$$= \frac{7x+8-(x+4)}{3x+2}$$

$$= \frac{7x+8-x-4}{3x+2} = \frac{6x+4}{3x+2}$$

$$= \frac{2\cancel{(3x+2)}}{\cancel{3x+2}} = 2.$$

$\boxed{27}$ $$\frac{4}{p-9} - \frac{2}{9-p}$$

$$\frac{4}{p-9} + \frac{2}{p-9} = \frac{6}{p-9}$$

$\boxed{32}$ Simplify:

$$\frac{\frac{1}{y+3} - \frac{1}{y}}{\frac{1}{y}} = \frac{y(y+3)\left[\frac{1}{y+3} - \frac{1}{y}\right]}{y(y+3)\left[\frac{1}{y}\right]}$$

$$= \frac{\frac{y(y+3)}{y+3} - \frac{y(y+3)}{y}}{\frac{y(y+3)}{y}}$$

$$= \frac{y - (y+3)}{y+3} = \frac{y-y-3}{y+3}$$

$$= -\frac{3}{y+3}$$

Method 2:

$$\frac{\frac{y}{1} + \frac{1}{y^2-9}}{\frac{1}{y+3}}$$

$$\frac{\frac{y(y^2-9)+1}{y^2-9}}{\frac{1}{y+3}}$$

$$\frac{y^3-9y+1}{y^2-9} \cdot \frac{(y+3)}{1}$$

$$\frac{(y^3-9y+1) \cdot (y+3)}{y^2-9}$$

$$= \frac{(y^3-9y+1)\cancel{(y+3)}}{(y-3)\cancel{(y+3)}} = \frac{y^3-9y+1}{y-3}$$

section 1-6.

طالبات
التحصيني

8) $\frac{5^9}{5^7} = 5^{9-7} = 5^2 = 25$

$\boxed{1}$ (a) $5^{-3} = \frac{1}{5^3} = \frac{1}{125}$

(b) $-5^{-3} = -\frac{1}{5^3} = -\frac{1}{125}$

(c) $(-5)^{-3} = \frac{1}{(-5)^3} = \frac{1}{-125} = -\frac{1}{125}$

(d) $-(-5)^{-3} = -\frac{1}{(-5)^3} = -\frac{1}{-125} = \frac{1}{125}$

18 $\frac{12k^{-2}(k^{-3})^{-4}}{6k^5}$

$= \frac{12k^{-2}\ k^{12}}{6\ k^5}$

$= \frac{12}{6}\ \frac{k^{-2+12}}{k^5}$

$= 2\ \frac{k^{10}}{k^5} = 2k^{10-5} = 2k^5$

22 $\left(-\frac{8}{27}\right)^{\frac{1}{3}} = -\frac{2}{3}$

20 $(121)^{\frac{1}{2}} = \sqrt{121} = 11$

$\boxed{\div 4}$ $\left(\frac{8}{27}\right)^{\frac{2}{3}}$

(a)

$$= \left(\left(\frac{8}{27}\right)^{\frac{1}{3}}\right)^{2}$$

$$= \left(\frac{2}{3}\right)^{2} = \frac{4}{9}$$

(b) $\left(\frac{8}{27}\right)^{-\frac{2}{3}} = \left(\frac{27}{8}\right)^{\frac{2}{3}}$

$$\left(\left(\frac{27}{8}\right)^{\frac{1}{3}}\right)^{2} = \left(\frac{3}{2}\right)^{2} = \frac{9}{4}$$

(c) $-\left(\frac{27}{8}\right)^{\frac{2}{3}} = -\left(\left(\frac{27}{8}\right)^{\frac{1}{3}}\right)^{2}$

$$= -\left(\frac{3}{2}\right)^{2} = -\frac{9}{4}$$

(d) $-\left(\frac{27}{8}\right)^{-\frac{2}{3}} = -\left(\frac{8}{27}\right)^{\frac{2}{3}}$

$$= -\left(\frac{2}{3}\right)^{2} = -\frac{4}{9}$$

31) $r^{-\frac{8}{9}} \, r^{\frac{17}{9}} = r^{-\frac{8}{9}+\frac{17}{9}}$

$= r^{\frac{9}{9}} = r^{1} = r$

39

$(2z^{\frac{1}{2}} + z)(z^{\frac{1}{2}} - z)$

$2z^{\frac{1}{2}} . z^{\frac{1}{2}} - 2z^{\frac{1}{2}} . z + z . z^{\frac{1}{2}} - z^{1} . z^{1}$

$2z^{\frac{1}{2}+\frac{1}{2}} - 2z^{\frac{1}{2}+\frac{1}{1}} + z^{1+\frac{1}{2}} - z^{2}$

$2z^{1} - 2z^{\frac{3}{2}} + z^{\frac{3}{2}} - z^{2}$

$2z^{1} - z^{\frac{3}{2}} - z^{2}$

62 write using exponents and evaluate

$$\sqrt[7]{128} = (128)^{\frac{1}{7}} = 2.$$

100 Simplify

$$\frac{\sqrt[3]{8m^2 n^3}\ \sqrt[3]{2m^2}}{\sqrt[3]{32m^4 n^3}}$$

$$= \frac{\sqrt[3]{8m^2 n^3 \cdot 2m^2}}{\sqrt[3]{32m^4 n^3}}$$

$$= \sqrt[3]{\frac{8.2\, m^4 n^3}{32\, m^4 n^3}}$$

$$= \sqrt[3]{\frac{16}{32}} = \sqrt[3]{\frac{1}{2}} = \left(\frac{1}{2}\right)^{\frac{1}{3}}$$

$$= \frac{1}{\sqrt[3]{2}}$$

(101) $\sqrt[4]{\frac{7}{t^{12}}} + \sqrt[4]{\frac{9}{t^{4}}}$

$$\sqrt[4]{\frac{7}{(t^{3})^{4}}} + \sqrt[4]{\frac{9}{t^{4}}}$$

$$\frac{\sqrt[4]{7}}{\sqrt[4]{(t^{3})^{4}}} + \frac{\sqrt[4]{9}}{\sqrt[4]{t^{4}}}$$

$$\frac{\sqrt[4]{7}}{|t^{3}|} + \frac{\sqrt[4]{9}}{|t|} \qquad t>0 \quad |t| = t$$

$$\frac{\sqrt[4]{7}}{t^{3}} + \frac{\sqrt[4]{9}}{t}$$

$$\frac{\sqrt[4]{7} + t^{2}\sqrt[4]{9}}{t^{3}}$$

$$= \frac{\sqrt[4]{7} + t^{2}\sqrt[4]{9}}{t^{3}}$$

No 5) **Rationalize the denominator**

$$\frac{1+\sqrt{3}}{(3\sqrt{5}+2\sqrt{3})} = \frac{(1+\sqrt{3})(3\sqrt{5}-2\sqrt{3})}{(3\sqrt{5}+2\sqrt{3})(3\sqrt{5}-2\sqrt{3})}$$

$$= \frac{3\sqrt{5}-2\sqrt{3}-3\sqrt{15}-2\sqrt{9}}{(3\sqrt{5})^2-(2\sqrt{3})^2}$$

$$= \frac{3\sqrt{5}-2\sqrt{3}-3\sqrt{15}-2.3}{45-12}$$

$$= \frac{3\sqrt{5}-2\sqrt{3}-3\sqrt{15}-6}{33}$$

Chapter 2

2.1

2/ True

9/ $5x+4=3x-4$

$5x-3x=-4-4$

$\frac{\cancel{2}x}{\cancel{2}}=\frac{-8}{2}$

$x=-4$

20/ $\frac{1}{15}(2x+5)=\frac{x+2}{9}$

$18x+45=15x+30$

$\frac{\cancel{3}x}{\cancel{3}}=\frac{-15}{3}$

$x=-5$

25/ $0.5x+\frac{4}{3}x=x+10$

$\frac{12}{15}x+\frac{5}{15}=\frac{x}{9}+\frac{2}{9}$

$\frac{12}{15}x-\frac{1}{9}x=\frac{2}{9}-\frac{5}{15}$

$x(\frac{2}{15}-\frac{1}{9})=\frac{2}{9}-\frac{5}{15}$

$x(\frac{1}{45})=-\frac{1}{9}$

$x=-5$

2.2

9/ $5+i$

complex

12/ $\sqrt{-25}$

$= 5i$

13/ $\sqrt{-10}$

$= \sqrt{10}\, i$

14/ $\sqrt{-288}$

$= 12\sqrt{2}\, i$

15/ $-\sqrt{-18}$

$= -3\sqrt{2}\, i$

Exercisos 2.2

(21)

حساب آلة

$$\frac{\sqrt{-6}\cdot\sqrt{-2}}{\sqrt{3}} = \frac{\sqrt{-1\cdot 6}\cdot\sqrt{-1\cdot 2}}{\sqrt{3}} = \frac{\sqrt{-1}\cdot\sqrt{6}\cdot\sqrt{-1}\cdot\sqrt{2}}{\sqrt{3}}$$

$\sqrt{-1} = i$

$$= \frac{\sqrt{12}\; i^2}{\sqrt{3}} = \sqrt{\frac{12}{3}}\,(-1) = -\sqrt{4} = -2$$

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(25)

$$(3+2i) + (9-3i)$$

حساب آلة

$$= (3+9) + (2-3)i$$

$$= 12 - i$$

جمع عددين مركبة
نجمع الجزء الحقيقي مع الحقيقي
و الخيالي مع الخيالي

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(38)

$$\frac{6+2i}{1+\cancel{\ }2i}$$

حساب آلة

قسمة عددين مركبة
نضرب البسط والمقام
في مرافق المقام

$$= \frac{6+2i}{1+2i}\cdot\frac{1-2i}{1-2i}$$

$$= \frac{(6+2i)(1-2i)}{(1+2i)(1-2i)} =$$

ضرب أقواس ←

قاعدة الفرق بين مربعين ←

$$= \frac{6-12i+2i+4}{1^2+2^2} = \frac{10-10i}{5} = 2-2i$$

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(47)

$$i^{22} = (i^2)^{11} = (-1)^{11} = -1$$

Exercises 2.3 P.(70):

Solve each equation by zero-factor property:
استخدي بتحليل.

(7) $x^2-5x+6=0$

$(x-2)(x-3)=0$

$x-2=0$ or $x-3=0$

$x=2 \quad , x=3$

∴ Solution Set $\{2,3\}$

(12) $25x^2+30x+9=0$

$(5x+3)(5x+3)=0$

$5x+3=0$ or $5x+3=0$

$x=\frac{-3}{5} \quad , x=\frac{-3}{5}$

∴ Solution Set $\left\{-\frac{3}{5}\right\}$

$5x \quad +3$
$5x \quad +3$
$15x$
$15x$
$30x$

Solve each equation by the square root property.
استخدي خاصية الجذر التربيعي

(18) $(5x-3)^2=-3$

$5x-3=\pm\sqrt{-3}$

$5x=3\pm\sqrt{3}\,i$

$x=\frac{3}{5}\pm\frac{\sqrt{3}}{5}i$

∴ Solution Set $\left\{\frac{3}{5}\pm\frac{\sqrt{3}}{5}i\right\}$

using quadratic formula. استخدم القانون العام

(26) $x^2 - x - 1 = 0$

$a = 1, \ b = -1, \ c = -1$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-1)}}{2(1)}$$

$$= \frac{1 \pm \sqrt{1+4}}{2} = \frac{1}{2} \pm \frac{\sqrt{5}}{2}$$

$\therefore$ Solution set $\left\{ \frac{1}{2} \pm \frac{\sqrt{5}}{2} \right\}$

Determine the number of distinct solutions, and tell whether they are rational, irrational or complex.

ج عدد الحلول ونوعها.
باستخدام المميز.

(44) $4x^2 = -6x + 3$

$4x^2 + 6x - 3 = 0$

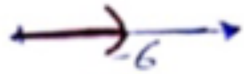
$a = 4, \ b = 6, \ c = -3$

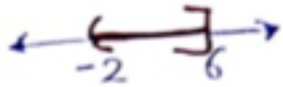
$$b^2 - 4ac = 6^2 - 4(4)(-3) = 36 + 48 = 84$$

$84 \begin{cases} \to + \text{ve} & \text{موجب} \\ \to \text{not perfect square} & \text{ليس مربع كامل} \end{cases}$

$\therefore$ Two irrational solutions حلين غير نسبيين

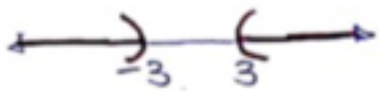
Exercises 2.4 p. (78)

① $x < -6 \Rightarrow (-\infty, -6)$ 

② $-2 < x \leq 6 \Rightarrow (-2, 6]$ 

③ $x \geq -6 \Rightarrow [-6, \infty)$ 

④  $\Rightarrow [-2, 6)$, $-2 \leq x < 6$

⑤  $\Rightarrow (-\infty, -3) \cup (3, \infty)$

$x < -3$ or $x > 3$

Solve :-

⑦ $-2x + 8 \leq 16$ متباينة خطية

$-2x \leq 16 - 8$

$-2x \leq 8$

$x \geq \frac{-8}{2}$ ← قسمنا على سالب

$x \geq -4$

Solution set $[-4, \infty)$ 

⑪ $\frac{4x+7}{-3} \leq 2x + 5$ نضرب الطرفين في (-3)

$4x + 7 \geq -3(2x + 5)$

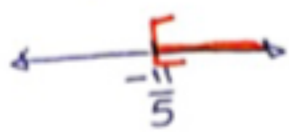
$4x + 7 \geq -6x - 15$

$4x + 6x \geq -15 - 7$

$10x \geq -22$

$x \geq -\frac{22}{10} \Rightarrow x \geq -\frac{11}{5}$

$\therefore$ Solution set $[-\frac{11}{5}, \infty)$



(19) $-3 \leqslant \frac{x-4}{-5} < 4$

نضرب جميع الأطراف في (-5)

$-3(-5) \geqslant x-4 > 4(-5)$

$15 \geqslant x-4 > -20$

$-20 < x-4 \leqslant 15$

بإضافة 4 لجميع الأطراف

$-20+4 < x-4+4 \leqslant 15+4$

$-16 < x \leqslant 19$

$\therefore$ Solution set $(-16, 19]$

(26) $x^2-2x \leqslant 1$

$x^2-2x-1 \leqslant 0$

$x^2-2x-1 = 0$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-(-2) \pm \sqrt{(-2)^2-4(1)(-1)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4+4}}{2} = \frac{2}{2} \pm \frac{\sqrt{8}}{2} = 1 \pm \sqrt{2}$$

$\therefore$ $x = 1-\sqrt{2}$ or $x = 1+\sqrt{2}$

$-\infty$ -1 $1-\sqrt{2}$ 0 $1+\sqrt{2}$ 3 ∞

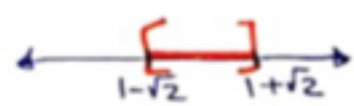
$x^2-2x-1 \leqslant 0$	$2 \leqslant 0$	$-1 \leqslant 0$	$2 \leqslant 0$
T or F	F	T	F

$x=-1 \Rightarrow (-1)^2-2(-1)-1 = 2$

$x=0 \Rightarrow 0^2-2(0)-1 = -1$

$x=3 \Rightarrow 3^2-2(3)-1 = 2$

$\therefore$ Solution set $[1-\sqrt{2}, 1+\sqrt{2}]$



Which of the following inequalities has solution $(-\infty, \infty)$?

أي من المتباينات حلها $(-\infty,\infty)$

ⓐ $(x-3)^2 \geq 0$

متباينة تربيعية

$(x-3)^2 = 0$

$x - 3 = 0 \Longrightarrow x = 3$

	$-\infty$ $\;$ 0 $\;$ 3	4 $\;$ ∞
$(x-3)^2 \geq 0$	$9 \geq 0$	$1 \geq 0$
	T	T

$x = 0 \Rightarrow (0-3)^2 = 9$

$x = 4 \Rightarrow (4-3)^2 = 1$

$\therefore$ Solution set $(-\infty, 3] \cup [3, \infty) = (-\infty, \infty)$

ⓑ $(5x-6)^2 \leq 0$

باستخدام خاصية الجذر التربيعي

$(5x-6)^2 = 0$

$5x - 6 = 0 \Longrightarrow x = \frac{6}{5}$

	$-\infty$ $\;$ 0 $\;$ $\frac{6}{5}$	2 $\;$ ∞
$(5x-6)^2 \leq 0$	$36 \leq 0$	$16 \leq 0$
	F	F

$x = 0 \Rightarrow (5(0)-6)^2 = 36$

$x = 2 \Rightarrow (5(2)-6)^2 = 16$

المتباينة متحققة فقط عند النقطة $\frac{6}{5}$.

$\therefore$ Solution set $\left\{\frac{6}{5}\right\}$

ⓒ $(6x+4)^2 > 0$

$(6x+4)^2 = 0 \Longrightarrow 6x + 4 = 0 \Longrightarrow x = \frac{-4}{6} = \frac{-2}{3}$

	$-\infty$ $\;$ -1 $\;$ $-\frac{2}{3}$	0 $\;$ ∞
$(6x+4)^2 > 0$	$4 > 0$	$16 > 0$
	T	T

$x = -1 \Rightarrow (6(-1)+4)^2 = 4$

$x = 0 \Rightarrow (6(0)+4)^2 = 16$

Solution set $(-\infty, -\frac{2}{3}) \cup (\frac{2}{3}, \infty) \rightsquigarrow$ ليست $(-\infty,\infty)$

d) $(8x+7)^2 < 0$

$(8x+7)^2 = 0$

$8x+7=0 \Longrightarrow x = -\frac{7}{8}$

$-\infty \quad -1 \quad -\frac{7}{8} \quad 0 \quad \infty$

$(8x+7)^2<0$	$1<0$	$49<0$
	F	F

$x=-1 \Longrightarrow (8(-1)+7)^2 = 1$

$x=0 \Longrightarrow (0+7)^2 = 49$

$\therefore$ Solution set ϕ . No solution

(43) $\frac{x+3}{x-5} \leq 1$ متباينة كسرية

$\frac{x+3}{x-5} - 1 \leq 0$

$\frac{x+3-(x-5)}{x-5} \leq 0$

$\frac{x+3-x+5}{x-5} \leq 0$

$\frac{8}{x-5} \leq 0$

المقام = صفر أو البسط = صفر .

$8=0$ or $x-5=0 \Longrightarrow x=5$

تعارض

$-\infty \quad 0 \quad 5 \quad 6 \quad \infty$

$\frac{8}{x-5} \leq 0$	$-\frac{8}{5} \leq 0$	$8 \leq 0$
	T	F

$x=0 \Longrightarrow \frac{8}{0-5} = -\frac{8}{5}$

$x=6 \Longrightarrow \frac{8}{6-5} = 8$

$\therefore$ Solution set $(-\infty, 5)$

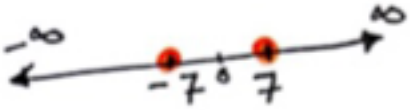
مفتوحة لانها صفر للمقام.

Exercises 2.5 : P.(83)

① $|x| = 7$ من خلال الحالة الأولى.

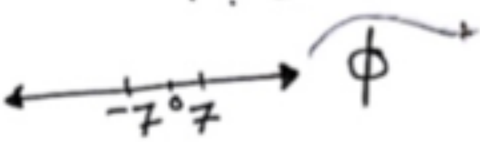
$x = -7$ or $x = 7$

Solution set $\{-7, 7\}$



② $|x| = -7 \Rightarrow$ مستحيل ان تكون القيمة المطلقة تساوي عدد سالب.

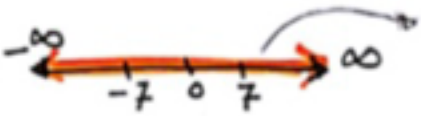
Solution set ϕ



لا يوجد حل

③ $|x| > -7 \Rightarrow$ دائماً القيمة المطلقة أكبر من الأعداد السالبة

Solution set $\mathbb{R}$

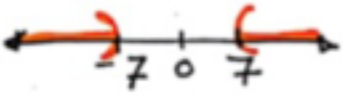


جميع الأعداد على خط الأعداد

④ $|x| > 7 \Rightarrow$ من الحالة (3)

$x < -7$ or $x > 7$

Solution set $(-\infty, -7) \cup (7, \infty)$



⑤ $|x| < 7 \Rightarrow$ من الحالة (2)

$-7 < x < 7$

Solution set $(-7, 7)$

⑥ $|x| \geq 7 \Rightarrow$ (3) من الحالة

$x \leq -7$ or $x \geq 7 \Rightarrow$ Solution set $(-\infty, -7] \cup [7, \infty)$

⑦ $|x| \leq 7 \Rightarrow$ (2) من الحالة

$-7 \leq x \leq 7 \Rightarrow$ Solution set $[-7, 7]$

⑧ $|x| \neq 7$

القيمة المطلقة لاتساوي 7 تعني ان القيمة المطلقة أكبر من 7 أو القيمة المطلقة أقل من 7

$|x| > 7$ or $|x| < 7$

من الحالة (3) — من الحالة (2)

$x < -7$ or $x > 7$ — $-7 < x < 7$

$(-\infty, -7) \cup (7, \infty)$ — $(-7, 7)$

⑨ Solve $|3x-1| = 2$ من الحالة (1)

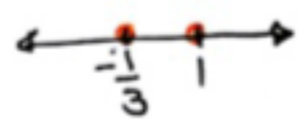
$3x-1 = 2$ or $3x-1 = -2$

$3x = 2+1$, $3x = -2+1$

$3x = 3$, $3x = -1$

$x = 1$, $x = -\frac{1}{3}$

$\therefore$ Solution set $\left\{-\frac{1}{3}, 1\right\}$



⑮ $|4-3x| = |2-3x|$ من الحالة (4)

$4-3x = 2-3x$ or $4-3x = -(2-3x) = -2+3x$

$-3x+3x = 2-4$, $-3x-3x = -2-4$

$0 = -2$, $-6x = -6$

تعارض . $x = 1$

$\therefore$ Solution set $\{1\}$

(18) $|2x+5|<3$ من الحالة (2)

بإضافة (-5) لجميع الأطراف

$$-3<2x+5<3$$

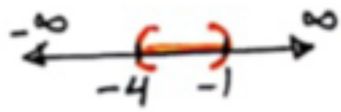
$$-3-5<2x+5-5<3-5$$

$$-8<2x<-2$$

$$\frac{-8}{2}<x<\frac{-2}{2}$$

$$-4<x<-1$$

Solution set $(-4,-1)$



(37) $|3x+2|>0$ من الحالة (3)

$3x+2>0$ or $3x+2<0$

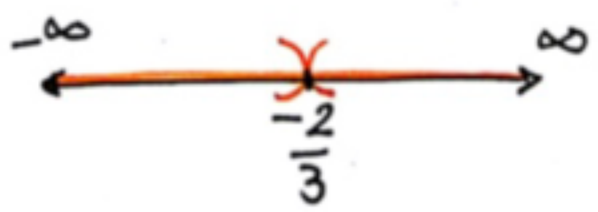
$3x>-2$ $\qquad$ $3x<-2$

$x>\frac{-2}{3}$ $\qquad$ $x<-\frac{2}{3}$

Solution set $\left(-\infty,\frac{-2}{3}\right)\cup\left(\frac{-2}{3},\infty\right)$

هذه الفترة نستطيع كتابتها بالشكل $R-\left\{\frac{-2}{3}\right\}$

يعني جميع الاعداد الحقيقية تحقق المتباينة ماعدا العدد $-\frac{2}{3}$



Chapter 3

* $\boxed{3.1}$ *

* $\boxed{96}$ *

5] not Function. Domain $= \{2, 3, 5\}$, Range $= \{5, 7, 9, 11\}$

6] Function. Domain $= \{1, 2, 3, 4\}$, Range $= \{10, 15, 19, 17\}$

7] Function. Domain $= \{0, 1, 2\}$, Range $= \{0, -1, -2\}$

8] Function.

9] Function. Domain $= (-\infty, \infty)$, Range $= [4, \infty)$

10] not Function. Domain $= [-4, 4]$, Range $= [-3, 3]$

11] Function. Domain $= [-2, 2]$, Range $= [4, 0]$

21] $f(-3) = -3(-3) + 4 = 9 + 4 = 13$

22] $g(10) = -(10)^2 + 4(10) + 1 = 59$

23] $f(-\frac{7}{3}) = -3(-\frac{7}{3}) + 4 = 7 + 4 = 11$

24] $g(-\frac{1}{4}) = -(-\frac{1}{4})^2 + 4(-\frac{1}{4}) + 1 = -\frac{1}{4} - 1 + 1 = -\frac{1}{4}$

25] $g(k) = -k^2 + 4k + 1$

26] $g(-x) = -x^2 - 4x + 1$

27] $f(a+4) = -3(a+4) + 4 = -3a - 12 + 4 = -3a - 8$

28] $f(3t-2) = -3(3t-2) + 4 = -9t + 6 + 4 = -9t + 10$

* $\boxed{98}$ * 39| $(-\infty,1]$ incresing

$[1,4]$ Constant

$[4,\infty)$ decresing

40| $(-\infty,0]$ incresing

$[0,\infty)$ decresing

41| $(-\infty,-3)$ decresing

$(-3,3]$ Constant

$(3,\infty)$ incresing

---

* $\boxed{3.2}$ *

* $\boxed{103}$ * 7| $m = \frac{4-3}{3+1} = \frac{1}{4}$

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{1}{4}(x+1)$

$\boxed{y = \frac{1}{4}x + \frac{13}{4}}$ slope-Intercept

$\boxed{\frac{1}{4}x - y = -\frac{13}{4}}$ standard form

15| $y = 3x - 1$. The slope $= 3$ & y-Intercept $= -1$

19| $y - \frac{3}{2}x - 1 = 0 \Rightarrow y = \frac{3}{2}x + 1$ & The slope $= \frac{3}{2}$ & y-Intercept $= 1$

26| $m = 0$

$(y - y_1) = m(x - x_1)$

$y - 6 = 0 \Rightarrow \boxed{y = 6}$

Exercises 3.3 p. (111)

$$f(x) = x^2 + 3 \quad , \quad g(x) = -2x + 6$$

Find:

① $(f+g)(3) = f(3) + g(3)$

$$= (3^2+3) + (-2(3)+6)$$

$$= (9+3) + (-6+6)$$

$$= 12 + 0 = 12$$

② $(f-g)(-1) = f(-1) - g(-1)$

$$= ((-1)^2+3) - (-2(-1)+6)$$

$$= (1+3) - (2+6)$$

$$= 4 - 8 = -4$$

③ $(fg)(4) = f(4)\,g(4)$

$$= (4^2+3)(-2(4)+6)$$

$$= (16+3)(-8+6) = 19(-2) = -38$$

④ $\left(\frac{f}{g}\right)(-1) = \frac{f(-1)}{g(-1)} = \frac{((-1)^2+3)}{-2(-1)+6} = \frac{4}{8} = \frac{1}{2}$

Find $(f+g)(x)$, $(f-g)(x)$, $(fg)(x)$ and $\left(\frac{f}{g}\right)(x)$

Give the Domain. مجالاتكم عبارة عن تقاطع مجال f, g.

(5) $f(x) = 3x+4$, $g(x) = 2x-5$

لأنها كثيرات حدود

← مجالها $(-\infty,\infty)$

Domain of $f(x)$: $(-\infty,\infty)$

$g(x)$: $(-\infty,\infty)$

$$* \quad (f+g)(x) = f(x)+g(x)$$
$$= (3x+4)+(2x-5)$$
$$= 3x+4+2x-5$$
$$= 5x-1$$

Domain $(f+g)(x)$: $(-\infty,\infty)$ تقاطع مجالي f, g

$$* \quad (f-g)(x) = f(x)-g(x)$$
$$= (3x+4)-(2x-5)$$
$$= 3x+4-2x+5$$
$$= x+9$$

Domain $(f-g)(x)$: $(-\infty,\infty)$

$$* \quad (fg)(x) = f(x)\,g(x) = (3x+4)(2x-5)$$
$$= 6x^2-15x+8x-20$$
$$= 6x^2-7x-20$$

Domain $(fg)(x)$: $(-\infty,\infty)$

* $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{3x+4}{2x-5} \longrightarrow$ المقام ≠ الصفر.

$$2x-5 \neq 0 \Rightarrow x \neq \frac{5}{2}$$

Domain $\left(\frac{f}{g}\right)(x)$: $\left(-\infty, \frac{5}{2}\right) \cup \left(\frac{5}{2}, \infty\right)$

(6) $f(x) = 2x^2 - 3x \quad , \quad g(x) = x^2 - x + 3$

Domain $f(x), g(x)$: $(-\infty, \infty)$ لأنها كثيرات حدود

$$(f+g)(x) = f(x) + g(x)$$
$$= 2x^2 - 3x + x^2 - x + 3$$
$$= 3x^2 - 4x + 3$$

Domain $(f+g)(x)$: $(-\infty, \infty)$

$$(f-g)(x) = f(x) - g(x)$$
$$= (2x^2 - 3x) - (x^2 - x + 3)$$
$$= 2x^2 - 3x - x^2 + x - 3$$
$$= x^2 - 2x - 3$$

Domain $(f-g)(x)$: $(-\infty, \infty)$

$$(fg)(x) = f(x)\,g(x)$$
$$= (2x^2-3x)(x^2-x+3)$$
$$= 2x^4 - 2x^3 + 6x^2 - 3x^3 + 3x^2 - 9x$$
$$= 2x^4 - 5x^3 + 9x^2 - 9x$$

Domain $(fg)(x)$: $(-\infty, \infty)$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{2x^2-3x}{x^2-x+3}$$

$$x^2 - x + 3 \neq 0$$
$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(3)}}{2}$$
$$= \frac{1 \pm \sqrt{1-12}}{2} = \frac{1}{2} \pm \frac{\sqrt{-11}}{2} = \frac{1}{2} \pm \frac{\sqrt{11}}{2}\, i$$

أصفار المقام عبارة عن أعداد مركبة ⇐ جميع الأعداد الحقيقية مسموحة

∴ Domain $\left(\frac{f}{g}\right)(x)$: $(-\infty, \infty)$

7 $f(x) = \sqrt{4x-1}$

ما تحت الجذر أكبر من أو يساوي الصفر.

$$4x - 1 \geq 0$$

$$x \geq \frac{1}{4}$$

Domain $f(x)$: $[\frac{1}{4}, \infty)$

$g(x) = \frac{1}{x}$

المقام ≠ الصفر

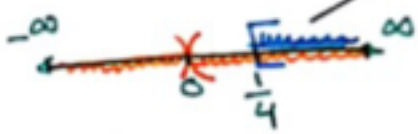
$$x \neq 0$$

Domain $g(x)$: $(-\infty, 0) \cup (0, \infty)$

$$(f+g)(x) = f(x) + g(x)$$

$$= \sqrt{4x-1} + \frac{1}{x}$$

التقاطع هنا العناصر المشتركة



Domain $(f+g)(x)$: $[\frac{1}{4}, \infty) \cap \left((-\infty, 0) \cup (0, \infty)\right)$

$$= [\tfrac{1}{4}, \infty)$$

التقاطع عبارة عن الفترة الأصغر.

$$(f-g)(x) = f(x) - g(x)$$

$$= \sqrt{4x-1} - \frac{1}{x}$$

Domain $(f-g)(x)$: $[\frac{1}{4}, \infty)$

تقاطع مجالي f, g

$$(fg)(x) = f(x)\,g(x) = \left(\sqrt{4x-1}\right)\left(\frac{1}{x}\right) = \frac{\sqrt{4x-1}}{x}$$

تقاطع المجالين $[\frac{1}{4}, \infty)$

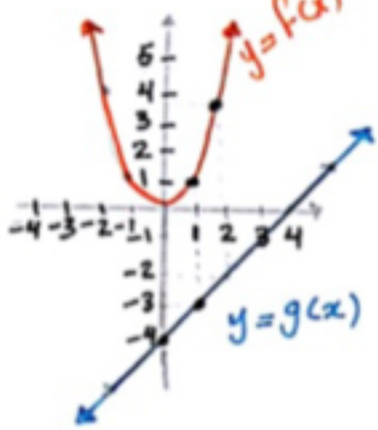
Domain $(fg)(x)$: $[\frac{1}{4}, \infty)$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{\sqrt{4x-1}}{\frac{1}{x}} = x\sqrt{4x-1}$$

Domain $\left(\frac{f}{g}\right)(x)$: $[\frac{1}{4}, \infty)$

Use the graph to evaluate :-

(12)



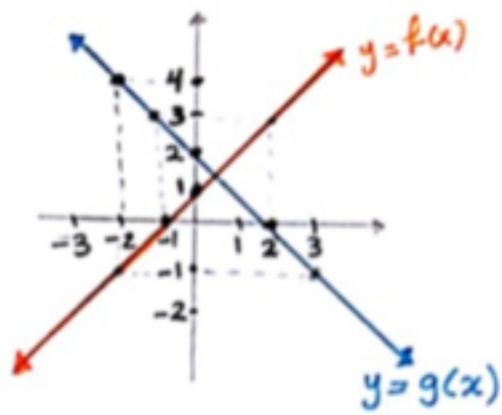
ⓐ $(f+g)(2) = f(2) + g(2)$
$= 4 + (-2) = 2$

ⓑ $(f-g)(1) = f(1) - g(1)$
$= 1 - (-3)$
$= 1 + 3 = 4$

ⓒ $(fg)(0) = f(0)\,g(0)$
$= 0(-4) = 0$

ⓓ $\left(\frac{f}{g}\right)(1) = \frac{f(1)}{g(1)} = \frac{1}{-3} = \frac{-1}{3}$

(13)



ⓐ $(f+g)(-1) = f(-1) + g(-1)$
$= 0 + 3 = 3$

ⓑ $(f-g)(-2) = f(-2) - g(-2)$
$= -1 - 4 = -5$

ⓒ $(fg)(0) = f(0)\,g(0)$
$= 1(2) = 2$

ⓓ $\left(\frac{f}{g}\right)(2) = \frac{f(2)}{g(2)} = \frac{3}{0}$ undefined
غير معرفة.

(14)

x	$f(x)$	$g(x)$
-2	0	6
0	5	0
2	7	-2
4	10	5

ⓐ $(f+g)(2) = f(2) + g(2) = 7 + (-2) = 5$

ⓑ $(f-g)(4) = f(4) - g(4) = 10 - 5 = 5$

ⓒ $(fg)(-2) = f(-2)\,g(-2) = 0(6) = 0$

ⓓ $\left(\frac{f}{g}\right)(0) = \frac{f(0)}{g(0)} = \frac{5}{0}$ undefined.

x	3	4	6
$f(x)$	1	3	9

x	2	7	1	9
$g(x)$	3	6	9	12

Find :-

(28) $(f\circ g)(2) = f(g(2)) = f(3) = 1$

(29) $(g\circ f)(3) = g(f(3)) = g(1) = 9$

(30) $(f\circ f)(4) = f(f(4)) = f(3) = 1$

– Find $(f\circ g)(x)$ and its domain.
$(g\circ f)(x)$ and its domain.

(36) $f(x) = \frac{2}{x}$, $g(x) = x+1$ → Domain $(-\infty,\infty)$

$(f\circ g)(x) = f(g(x)) = f(x+1)$

$= \frac{2}{x+1}$, $x+1 \neq 0 \Rightarrow x \neq -1$

Domain $(f\circ g)(x)$: $(-\infty,-1)\cup(-1,\infty)$

→ domain $x \neq 0$
$(-\infty,0)\cup(0,\infty)$

$(g\circ f)(x) = g(f(x)) = g\left(\frac{2}{x}\right)$

$= \frac{2}{x}+1 = \frac{2+x}{x} \rightarrow x \neq 0$

Domain $(g\circ f)(x)$: $(-\infty,0)\cup(0,\infty)$

(39) $f(x) = \dfrac{1}{x-2}$, $g(x) = \dfrac{1}{x}$

domain $x \neq 0$

$(-\infty, 0) \cup (0, \infty)$

$$(f \circ g)(x) = f(g(x)) = f\left(\frac{1}{x}\right)$$

$$= \frac{1}{\frac{1}{x} - 2} = \frac{1}{\frac{1-2x}{x}} = \frac{x}{1-2x}$$

مقام المقام يبسط

$$1 - 2x \neq 0 \Rightarrow x \neq \frac{1}{2}$$

$$(-\infty, \tfrac{1}{2}) \cup (\tfrac{1}{2}, \infty)$$

$\therefore$ Domain $(f \circ g)(x)$: $(-\infty, 0) \cup (0, \tfrac{1}{2}) \cup (\tfrac{1}{2}, \infty)$

domain $x \neq 2$

$(-\infty, 2) \cup (2, \infty)$

$$(g \circ f)(x) = g(f(x)) = g\left(\frac{1}{x-2}\right)$$

$$= \frac{1}{\frac{1}{x-2}} = x - 2$$

$\therefore$ Domain $(g \circ f)(x)$: $(-\infty, 2) \cup (2, \infty)$

Find f, g such that $(f \circ g)(x) = h(x)$.

أوجدي الدوال f , g.

(44) $h(x) = (6x-2)^2$

$g(x) = 6x-2 \quad , \quad f(x) = x^2$

اشترك $(f \circ g)(x) = f(g(x)) = f(6x-2) = (6x-2)^2$

(45) $h(x) = \sqrt{x^2-1}$

$g(x) = x^2-1 \quad , \quad f(x) = \sqrt{x}$

$(f \circ g)(x) = f(g(x)) = f(x^2-1) = \sqrt{x^2-1}$

(46) $h(x) = \sqrt{6x} + 12$

$g(x) = 6x \quad , \quad f(x) = \sqrt{x} + 12$

$(f \circ g)(x) = f(g(x)) = f(6x) = \sqrt{6x} + 12$

Chapter 4

①

$\boxed{4.1}$

$\frac{6}{123}$ $f(x) = (x+3)^2 - 4$

a) $(-3, -4)$ b) $x = -3$

c) $(-\infty, \infty)$ d) $[-4, \infty)$ الرسم

e) $[-3, \infty)$ incresing

f) $(-\infty, -3]$ decresing.

$\frac{7}{123}$ $f(x) = -\frac{1}{2}(x+1)^2 - 3$

a) $(-1, -3)$ b) $x = -1$

c) $(-\infty, \infty)$ d) $(-\infty, -3]$ الرسم

e) $(-\infty, -1]$ incresing

f) $[-1, \infty)$ decresing

$\frac{9}{123}$ $f(x) = x^2 - 10x + 21$

$a = 1$ ، $b = -10$ ، $c = 21$

$h = -\frac{b}{2a} = -\frac{-10}{2(1)} = 5$

$k = f(h) = f(5) = -4$

a) $(5, -4)$ b) $x = 5$

c) $(-\infty, \infty)$

* $f(x) = a(x-h)^2 + k$

نقطة على المنحنى

$y = f(x) = a(x-5)^2 - 4$ $\boxed{(4, -3)}$

$-3 = a(4-5)^2 - 4$

الرسم

$-3 = a - 4$

$\boxed{a = 1}$

$f(x) = (x-5)^2 - 4$ open up.

d) $[-4, \infty)$

e) $[5, \infty)$ incresing

f) $(-\infty, 5)$ decresing

$\boxed{4.1}$

$\boxed{17}$ $h=2$, $k=-1$, $x=2$, $(0,0)$

$$f(x)=a(x-h)^2+k$$

$$y=a(x-2)^2-1$$

$$0=a(0-2)^2-1 \Rightarrow 0=4a-1$$

$$\Rightarrow \boxed{a=\frac{1}{4}}$$

$$f(x)=\frac{1}{4}(x-2)^2-1$$

$$=\frac{1}{4}(x^2-4x+4)-1$$

$$\boxed{y=\frac{1}{4}x^2-x}$$

$\boxed{18}$ $h=1$, $k=4$, $(0,2)$

$$f(x)=a(x-h)^2+k$$

$$y=a(x-1)^2+4$$

$$2=a(0-1)^2+4 \Rightarrow 2=a+4$$

$$\Rightarrow \boxed{a=2}$$

$$f(x)=2(x-1)^2+4$$

$$=2(x^2-2x+1)+4$$

$$\boxed{y=2x^2-4x+6}$$

$\boxed{4.2}$

$\boxed{3}$ $\dfrac{x^4+5x^3+4x^2-3x+9}{x+3} = x^3+2x^2-2x+3$

$$\begin{array}{r|rrrrr} -3 & 1 & 5 & 4 & -3 & 9 \\ & & -3 & -6 & 6 & -9 \\ \hline & 1 & 2 & -2 & 3 & 0 \end{array}$$

$\boxed{6}$ $\dfrac{x^3+x^2+\frac{1}{2}x+\frac{1}{8}}{x+\frac{1}{2}} = x^2+\frac{1}{2}x+\frac{1}{4}$

$$\begin{array}{r|rrrr} -\frac{1}{2} & 1 & 1 & \frac{1}{2} & \frac{1}{8} \\ & & -\frac{1}{2} & -\frac{1}{4} & -\frac{1}{8} \\ \hline & 1 & \frac{1}{2} & \frac{1}{4} & 0 \end{array}$$

$\boxed{23}$ $f(x) = 2x^3+9x^2-16x+12$, $k=1$

$$\begin{array}{r|rrrr} 1 & 2 & 9 & -16 & 12 \\ & & 2 & 11 & -5 \\ \hline & 2 & 11 & -5 & 7 \end{array}$$

The reminder is not 0, So 1 is not a Zero of $f(x)$.

$\boxed{29}$ $f(x) = 2x^3-x^2+3x-5$, $k=2-i$

$$\begin{array}{r|rrrr} 2-i & 2 & -1 & 3 & -5 \\ & & 4-2i & 4-7i & 7-21i \\ \hline & 2 & 3-2i & 7-7i & 2-21i \end{array}$$

$\boxed{4.3}$

$\boxed{3}$ $x^3 - 5x^2 + 3x + 1$ ، $x-1$

نفس الفكرة $\boxed{6}$

$$\begin{array}{r|rrrr} 1 & 1 & -5 & 3 & 1 \\ & & 1 & -4 & -1 \\ \hline & 1 & -4 & -1 & 0 \end{array}$$

Because the reminder is Zero, $x-1$ is a factor.

$x^3 - 5x^2 + 3x + 1 = (x-1)(x^2 - 4x - 1)$

$\boxed{8}$ $2x^4 + 5x^3 - 2x^2 + 5x + 6$ ، $x+3$

$$\begin{array}{r|rrrrr} -3 & 2 & 5 & -2 & 5 & 6 \\ & & -6 & 3 & -3 & -6 \\ \hline & 2 & -1 & 1 & 2 & 0 \end{array}$$

Because the reminder is Zero, $x+3$ is a factor

$2x^4 + 5x^3 - 2x^2 + 5x + 6 = (x+3)(2x^3 - x^2 + x + 2)$

$\boxed{13}$ $f(x) = 2x^3 + (3-2i)x^2 + (-8-5i)x + (3+3i)$ ، $k = 1+i$

$$\begin{array}{r|rrrr} 1+i & 2 & 3-2i & -8-5i & 3+3i \\ & & 2+2i & 5+5i & -3-3i \\ \hline & 2 & 5 & -3 & 0 \end{array}$$

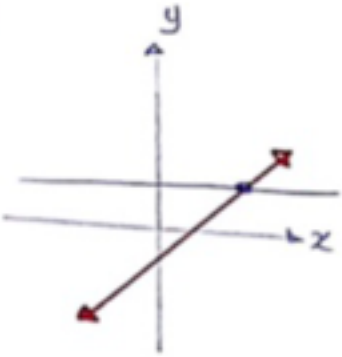
$f(x) = (x-(1+i))(2x^2 + 5x - 3)$

Chapter 5

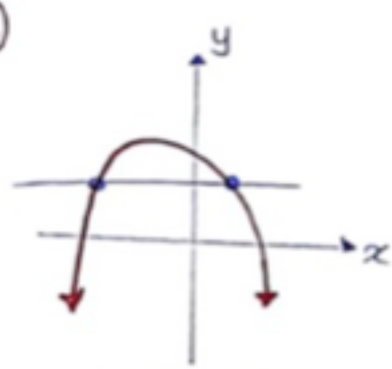
Exercises 5.1 P.(147)

Decide whether each function is one to one.

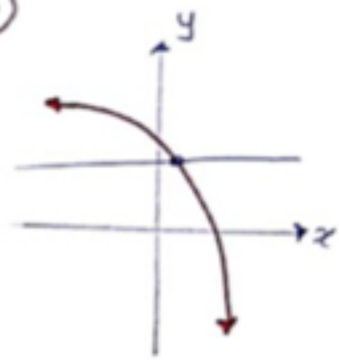
حددي أي من الدوال هي 1-1 ؟

① 

1-1

② 

Not 1-1

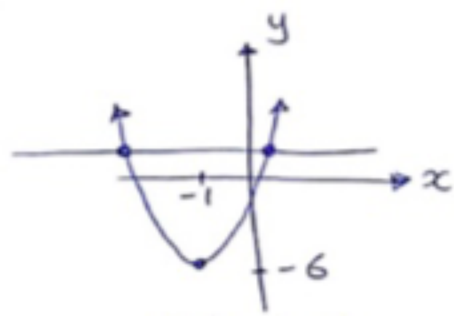
③ 

1-1

⑧ $y = 2(x+1)^2 - 6 \rightsquigarrow$ معادلة تربيعية ليست 1-1

vertex $(h,k) = (-1,-6)$

الأفضل نستخدم الرسم في الدالة التربيعية .



Not 1-1

Use the definition of inverse:

⑳ $f(x) = 2x+4 \quad , g(x) = \frac{1}{2}x - 2$

$$(f \circ g)(x) = f(g(x)) = f\left(\tfrac{1}{2}x - 2\right) = 2\left(\tfrac{1}{2}x - 2\right) + 4$$

$$= \tfrac{2}{2}x - 4 + 4 = x$$

$$(g \circ f)(x) = g(f(x)) = g(2x+4) = \tfrac{1}{2}(2x+4) - 2$$

$$= \tfrac{2}{2}x + \tfrac{4}{2} - 2 = x$$

$\therefore$ g is inverse of $f(x)$.

(23) $f(x) = \frac{2}{x+6} \quad , g(x) = \frac{6x+2}{x}$

$$(f \circ g)(x) = f(g(x)) = f\left(\frac{6x+2}{x}\right) = \frac{2}{\frac{6x+2}{x} + 6}$$

$$= \frac{2}{\frac{6x+2}{x} + \frac{6x}{x}} = \frac{2x}{12x+2}$$

, g is <u>not</u> inverse of $f(x)$

20/148 $f(x) = 2x + 4$. $g(x) = \frac{1}{2}x - 2$

f is one to one, so the function does have an inverse. Since it is one to one, we now find $(f \circ g)(x)$ and $(g \circ f)(x)$.

$$(f \circ g)(x) = f(g(x)) = f\left(\tfrac{1}{2}x - 2\right) = 2\left(\tfrac{1}{2}x - 2\right) + 4$$
$$= x - 4 + 4 = x$$

$$(g \circ f)(x) = g(f(x)) = g(2x+4) = \tfrac{1}{2}(2x+4) - 2 = x + 2 - 2 = x$$

Since $(f \circ g) = x$ and $(g \circ f)(x) = x$, function g is the inverse of function f.

23/148 $f(x) = \frac{2}{x+6}$. $g(x) = \frac{6x+2}{x}$

$$f(a) = f(b)$$

$$\frac{2}{a+6} = \frac{2}{b+6}$$

$$2(b+6) = 2(a+6)$$

$$b+6 = a+6$$

$$b = a$$

f is one to one, so the function does have an inverse. Since it is one to one, we now find $(f \circ g)(x)$ and $(g \circ f)(x)$.

$$(f \circ g)(x) = f(g(x)) = f\left(\frac{6x+2}{x}\right) = \frac{2}{\frac{6x+2}{x} + 6}$$

$$= \frac{2}{\frac{6x+2+6x}{x}} = \frac{2x}{12x+2} = \frac{x}{6x+1}$$

$\boxed{5.2}$

6) $g(\frac{3}{2}) = (\frac{1}{4})^{\frac{3}{2}} = ((\frac{1}{4})^{\frac{1}{2}})^3 = (\frac{1}{2})^3 = \frac{1}{8}$

31) $4^x = 2$

$(2^2)^x = 2$

$2^{2x} = 2 \Rightarrow 2x = 1 \Rightarrow x = \frac{1}{2}$

The solution set is $\{\frac{1}{2}\}$

35) $27^{4x} = 9^{x+1}$

$(3^3)^{4x} = (3^2)^{x+1}$

$3^{12x} = 3^{2x+2} \Rightarrow 12x = 2x+2$

$\Rightarrow 10x = 2 \Rightarrow \boxed{x = \frac{1}{5}}$

The solution set is $\{\frac{1}{5}\}$

42) $x^{-6} = \frac{1}{64}$

$\frac{1}{x^6} = \frac{1}{64}$

$x^6 = 64 \Rightarrow x = \sqrt[6]{64} = 2$

The solution set is $\{2\}$.

5.3)

$\star$ $\boxed{163}$ $\star$

4) $\log_6 36 = 2$

$6^2 = 36$

13) $\log_4 x = 3$

$x = 4^3 \Rightarrow x = 64$

The solution set is $\{64\}$

17) $\log_{(x+3)} 6 = 1$

$(x+3)^1 = 6$

$x + 3 = 6 \Rightarrow \boxed{x = 3}$

The solution set is $\{3\}$

$\star$ $\boxed{164}$ $\star$

37) $\log_3 \dfrac{\sqrt{x}\,\sqrt[3]{y}}{w^2\sqrt{z}} = \log_3 x^{\frac{1}{2}} + \log_3 y^{\frac{1}{3}} - (\log_3 w^2 + \log_3 z^{\frac{1}{2}})$

$= \frac{1}{2}\log_3 x + \frac{1}{3}\log_3 y - 2\log_3 w - \frac{1}{2}\log_3 z$

42) $-\frac{2}{3}\log_5 5m^2 + \frac{1}{2}\log_5 25m^2 = \log_5 (25m^2)^{\frac{1}{2}} - \log_5 (5m^2)^{\frac{2}{3}}$

$= \log_5 \dfrac{5m}{\sqrt[3]{25m^4}}$

★ 5.4 ★

1) $7^x = 19$

$\ln 7^x = \ln 19$

$x \ln 7 = \ln 19$

$x = \frac{\ln 19}{\ln 7}$

The solution set is $\{\frac{\ln 19}{\ln 7}\}$

2) $(\frac{1}{2})^x = 12$

$\ln (\frac{1}{2})^x = \ln 12$

$x \ln \frac{1}{2} = \ln 12$

$x = \frac{\ln 12}{\ln 1/2}$

The solution set is $\{\frac{\ln 12}{\ln 1/2}\}$

3) $3^x = 7$

$\ln 3^x = \ln 7$

$x \ln 3 = \ln 7$

$x = \frac{\ln 7}{\ln 3} \approx 1.771$

The solution set is $\{1.771\}$

5) $0.8^x = 4$

$\ln 0.8^x = \ln 4$

$x \ln 0.8 = \ln 4$

$x = \frac{\ln 4}{\ln 0.8} \approx -6.213$

The solution set is $\{-6.213\}$

12) $3(2)^{x-2} + 1 = 100$

$3(2)^{x-2} = 99$

$(2)^{x-2} = 33$

$(x-2)\ln 2 = \ln 33$

$x \ln 2 - 2\ln 2 = \ln 33$

$x = \frac{\ln 33 + 2\ln 2}{\ln 2} = \ln 66$

≈ 4.189

The solution set is $\{4.189\}$

13) $2(1.05)^x + 3 = 10$

$2(1.05)^x = 7$

$(1.05)^x = \frac{7}{2}$

$x \ln(1.05) = \ln 7/2$

$x = \frac{\ln(3.5)}{\ln(1.05)} \approx 25.677$

The solution set is $\{25.677\}$

* $\boxed{5.4}$ *

14| $5(1.015)^{x-1980} = 8$

$$(1.015)^{x-1980} = \frac{8}{5}$$

$$(x-1980)\,\mathrm{Ln}(1.015) = \mathrm{Ln}\,1.6$$

$$x\,\mathrm{Ln}(1.015) = \mathrm{Ln}\,1.6 + 1980\,\mathrm{Ln}(1.015)$$

$$x = \frac{\mathrm{Ln}\,1.6 + \mathrm{Ln}(1.015)^{1980}}{\mathrm{Ln}(1.015)}$$

$$x \approx 2011.568$$

The solution set is $\{2011.568\}$

18| $5\,\mathrm{Ln}\,x = 10$

$$\mathrm{Ln}\,x = 2$$

$$e^{\ln x} = e^2$$

$$x = e^2$$

The solution set is $\{e^2\}$

19| $\mathrm{Ln}(4x) = 1.5$

$$e^{\ln(4x)} = e^{1.5}$$

$$4x = e^{1.5}$$

$$x = \frac{e^{1.5}}{4}$$

The solution set is $\{\frac{e^{1.5}}{4}\}$.

34| $\mathrm{Ln}(4x-2) - \mathrm{Ln}\,4 = -\mathrm{Ln}(x-2)$

$$\mathrm{Ln}\,\frac{(4x-2)}{4} = \mathrm{Ln}\,(x-2)^{-1}$$

$$\frac{4x-2}{4} = \frac{1}{x-2}$$

$$(4x-2)(x-2) = 4$$

$$4x^2 - 10x = 0 \Rightarrow 2x(2x-5) = 0 \Rightarrow x = 0,\ x = \frac{5}{2}$$

39| $\mathrm{Log}\,x^2 = (\mathrm{Log}\,x)^2$

$$2\,\mathrm{Log}\,x = \mathrm{Log}\,x\ \mathrm{Log}\,x$$

$$2 = \mathrm{Log}\,x$$

$$10^2 = x$$

$$x = 100$$

The solution set is $\{100\}$

Chapter 6

* $\boxed{6.1}$ *

* $\boxed{178}$ *

1] Complement:- $90^\circ - 60^\circ = 30^\circ$

supplement:- $180^\circ - 60 = 120^\circ$

5] Complement:- $90^\circ - 39^\circ\ 50' = 89^\circ\ 60' - 39^\circ\ 50' = 50^\circ\ 10'$

supplement:- $180^\circ - 39^\circ\ 50' = 179^\circ\ 60' - 39^\circ\ 50' = 140^\circ\ 10'$

6] Complement:- $90^\circ - 50^\circ\ 40'\ 50'' = 89^\circ\ 59'\ 60'' - 50^\circ\ 40'\ 50''$

$= 39^\circ\ 19'\ 10''$

supplement:- $180^\circ - 50^\circ\ 40'\ 50'' = 179^\circ\ 59'\ 60'' - 50^\circ\ 40'\ 50''$

$= 129^\circ\ 19'\ 50''$

7] $(20X+10)^\circ + (3X+9)^\circ = 180^\circ$

$23X + 19 = 180$

$23X = 161$

$\boxed{X = 7}$

Φ_1] $20X+10 = 20(7)+10 = 150^\circ$

Φ_2] $3X+9 = 3(7)+9 = 30^\circ$

8] $(5X+5)^\circ + (3X+5)^\circ = 90^\circ$

$8X + 10 = 90$

$8X = 80$

$\boxed{X = 10}$

Φ_1] $5X+5 = 5(10)+5 = 55^\circ$

Φ_2] $3X+5 = 3(10)+5 = 35^\circ$

10] $(6X-4)+(8X-12) = 180 \Rightarrow 14X - 16 = 180 \Rightarrow 14X = 196 \Rightarrow \boxed{X = 14}$

Φ_1] $6X-4 = 6(14)-4 = 80^\circ$

Φ_2] $8X-12 = 8(14)-12 = 100^\circ$

* $\boxed{6.1}$ *

11| 8| نفس فكرة

* $\boxed{179}$ * 20| $47^\circ\ 23' - 73^\circ\ 48' = -26^\circ\ 25'$

23| $55^\circ\ 30' + 12^\circ\ 44' - 8^\circ\ 15' = 59^\circ\ 59'$

24| $90^\circ - 36^\circ\ 18'\ 47'' = 89^\circ\ 59'\ 60'' - 36^\circ\ 18'\ 47''$

$= 53^\circ\ 41'\ 13''$

6.2/

39/ $\sec\theta$, given that $\cos\theta = \frac{5}{8}$

$$\sec\theta = \frac{8}{5}$$

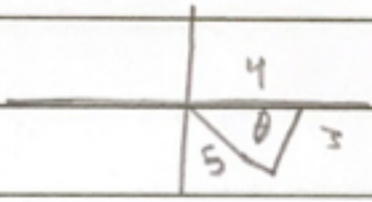
41/ $\cot\theta$, given that $\tan\theta = 18$

$$\cot\theta = \frac{1}{18}$$

42/ $\sin\theta$, given that $\sec\theta = \frac{\sqrt{24}}{3}$

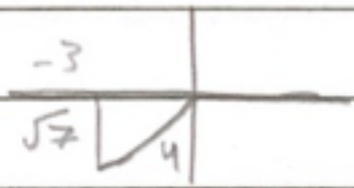
$$\csc\theta = \frac{3}{\sqrt{24}} = \frac{\sqrt{6}}{4}$$

60/ find $\sin\theta$, given that $\cos\theta = \frac{4}{5}$ and θ is in quadrant IV



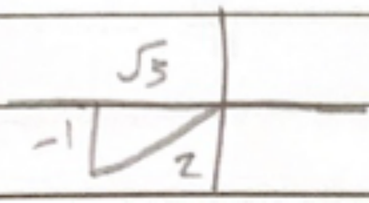
$$\sin\theta = \frac{-3}{5}$$

61/ find $\sec\theta$, given that $\tan\theta = \frac{\sqrt{7}}{3}$ and θ is in quandrant II



$$\sec\theta = \frac{4}{-3}$$

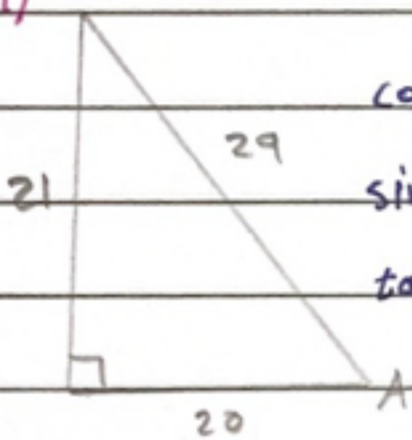
62/ find $\cot\theta$, given that $\csc\theta = -2$ and θ is in quadrant II



$$\cot\theta = \frac{\sqrt{3}}{-1} = -\sqrt{3}$$

6.3 /

1/



$\cos A = \frac{20}{29}$

$\sin A = \frac{21}{29}$

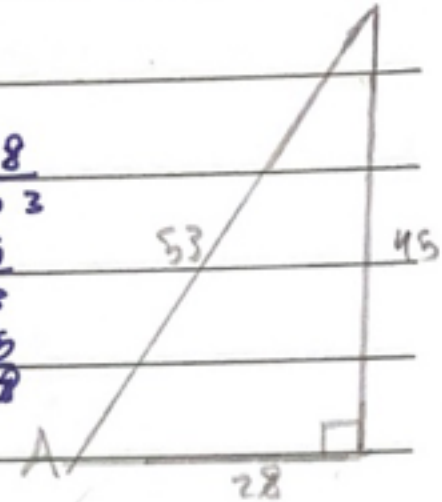
$\tan A = \frac{21}{20}$

2/

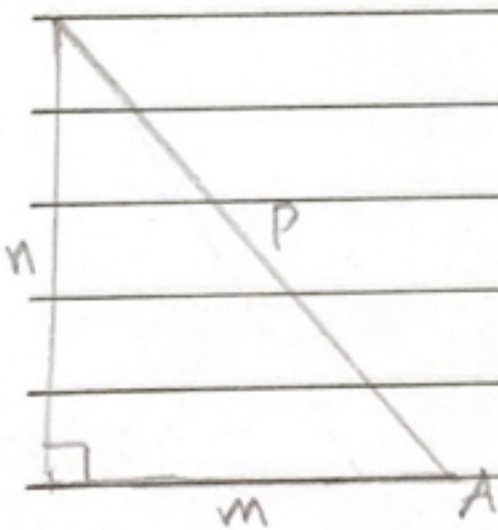
$\cos A = \frac{28}{53}$

$\sin A = \frac{45}{53}$

$\tan A = \frac{45}{28}$



3/

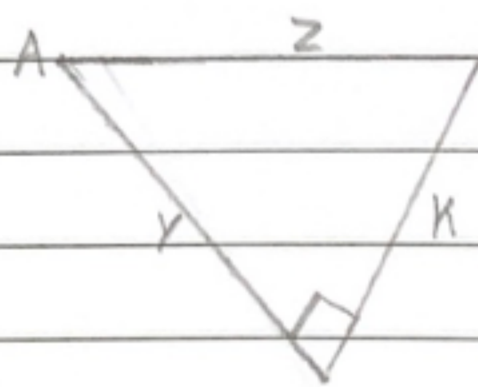


$\sin A = \frac{m}{p}$

$\cos A = \frac{n}{p}$

$\tan A = \frac{m}{n}$

4/



$\sin A = \frac{K}{z}$

$\cos A = \frac{Y}{z}$

$\tan A = \frac{K}{Y}$

Chapter 7

$\boxed{7.1}$

5] $\lim_{x\to 3} \frac{x+3}{x+6} = \frac{3+3}{3+6} = \frac{6}{9} = \frac{2}{3}$

7] $\lim_{x\to 3} \frac{x^2-6x+9}{x^2-9} = \lim_{x\to 3} \frac{(x-3)(x-3)}{(x-3)(x+3)} = \lim_{x\to 3} \frac{x-3}{x+3} = 0$

9] $\lim_{x\to 9} \frac{\sqrt{x}-3}{x-9} = \lim_{x\to 9} \frac{\sqrt{x}-3}{(\sqrt{x}-3)(\sqrt{x}+3)} = \lim_{x\to 9} \frac{1}{\sqrt{x}+3} = \frac{1}{6}$

11] $\lim_{x\to 0} \frac{|x-2|}{x-2} = \frac{|-2|}{-2} = -1$

15] $\lim_{y\to 1} \frac{y-4\sqrt{y}+3}{y^2-1} = \lim_{y\to 1} \frac{(\sqrt{y}-1)(\sqrt{y}-3)}{(\sqrt{y}-1)(\sqrt{y}+1)(y+1)} = \lim_{y\to 1} \frac{\sqrt{y}-3}{(\sqrt{y}+1)(y+1)} = \frac{-2}{4} = -\frac{1}{2}$

18] $\lim_{x\to 0} \frac{\sqrt{2+x^2}-\sqrt{2-x^2}}{x^2} \cdot \frac{\sqrt{2+x^2}+\sqrt{2-x^2}}{\sqrt{2+x^2}+\sqrt{2-x^2}} = \lim_{x\to 0} \frac{2+x^2-2+x^2}{x^2(\sqrt{2+x^2}+\sqrt{2-x^2})}$

$= \lim_{x\to 0} \frac{2}{\sqrt{2+x^2}+\sqrt{2-x^2}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$

32] $2-x^2 \le g(x) \le 2\cos 2x$

$\lim_{x\to 0} 2-x^2 = 0$ & $\lim_{x\to 0} 2\cos 2x = 2\cos 0 = 2$

Then $\lim_{x\to 0} g(x) = 0$

$\boxed{7.2}$

5] $\lim_{x\to -\infty} \frac{2x-1}{\sqrt{3x^2+x+1}} = \lim_{x\to -\infty} \frac{x(2-\frac{1}{x})}{\sqrt{x^2(3+\frac{1}{x}+\frac{1}{x^2})}} = \lim_{x\to -\infty} \frac{\cancel{x}(2-\overset{0}{\frac{1}{x}})}{\cancel{x}\sqrt{3+\underset{0}{\frac{1}{x}}+\underset{0}{\frac{1}{x^2}}}} = \frac{2}{\sqrt{3}}$

15] $\lim_{x \to -\infty} (\sqrt{x^2+2x} - \sqrt{x^2-2x}) = \lim_{x \to -\infty} \frac{(\sqrt{x^2+2x} - \sqrt{x^2-2x})(\sqrt{x^2+2x} + \sqrt{x^2-2x})}{\sqrt{x^2+2x} + \sqrt{x^2-2x}}$

$$= \lim_{x \to -\infty} \frac{x^2+2x-x^2+2x}{\sqrt{x^2(1+\frac{2}{x})} + \sqrt{x^2(1-\frac{2}{x})}}$$

$$= \lim_{x \to -\infty} \frac{4\cancel{x}}{\cancel{x}(\sqrt{1+\frac{2}{x}} + \sqrt{1-\frac{2}{x}})}$$

$$= \lim_{x \to -\infty} \frac{4}{\sqrt{1+\frac{2}{x}} + \sqrt{1-\frac{2}{x}}} = \frac{4}{2} = 2$$

$\boxed{7.3}$

4] $f(x) = \begin{cases} x & x < 0 \\ x^2 & x > 0 \end{cases}$

$$\underset{0}{\overset{x \qquad x^2}{\overline{\qquad\qquad}}}$$

$\lim_{x \to 0^+} f(x) = \lim_{x \to 0^+} x^2 = 0 \quad = \quad \lim_{x \to 0^-} f(x) = \lim_{x \to 0^-} x = 0$

Then $\lim_{x \to 0} f(x) = 0$

$f(c) = f(0) = 0$

Since $\lim_{x \to 0} f(x) = f(0)$, then $f(x)$ is Continuous at $x = 0$.

6] $\frac{x^2-4}{x-2}$ at $x = 2$

$\frac{x^2-4}{x-2} = \frac{(x-2)(x+2)}{(x-2)} = x+2$

8] $$\underset{2}{\overset{x^2 \qquad k-x^2}{\overline{\qquad\qquad}}}$$

$\lim_{x \to 2^+} k - x^2 = k-4$, $\lim_{x \to 2^-} x^2 = 4$.

Since f is Continuous, then $\lim_{x \to 2^+} f(x) = \lim_{x \to 2^-} f(x) \Rightarrow k-4 = 4 \Rightarrow \boxed{k=8}$