مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

بسم الله الرحمن الرحيم

محاضرات في ريض ١٠١ جامعة الملك سعود

محاضرات في كورس ريض MTHA101

عبدالله الحفني جوال ٠٥٨٣٤٢٢٢٠٠

Question(1)

A). Classify each of the following numbers into rational and irrational

$$\left\{\frac{\pi}{4}, \sqrt{\frac{9}{25}}, 6.108, 3+\frac{2}{5}, 3.4\bar{1}, \sqrt[3]{64}, 3.1256, \sqrt{\sqrt{36}+\sqrt{81}}\right\}$$

خطوات الحل

(i) rational $\left\{\sqrt{\frac{9}{25}}, 6.108, 3+\frac{2}{5}, 3.4\bar{1}, \sqrt[3]{64}, 3.1256\right\}$

(ii) Irrational $\left\{\frac{\pi}{4}, \sqrt{\sqrt{36}+\sqrt{81}}\right\}$

B). Solve the Following inequalities,and write your answer in an interval notation:

$i).\ 2-\frac{1}{x+3}<4$

خطوات الحل

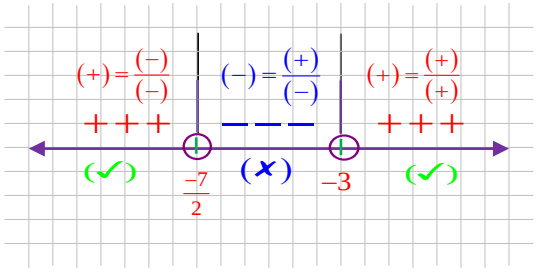
$$2-4-\frac{1}{x+3}<\cancel{4}-\cancel{4} \quad \boxed{\text{add.}(-4)}$$

$$-2-\frac{1}{x+3}<0 \quad \text{توحيد مقامات}$$

$$\frac{-2x-6-1}{x+3}<0 \Rightarrow \frac{-2x-7}{x+3}<0$$

$$\frac{2x+7}{x+3}>0$$

$2x+7=0$	$x+3=0$
$2x=-7$	$x=-3$
$x=-\frac{7}{2}$	



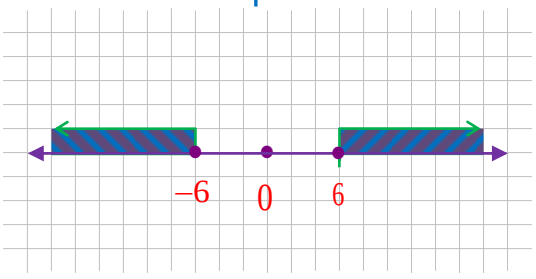
$$S.S=\left(-\infty,-\frac{7}{2}\right)\cup(-3,+\infty)$$

$ii).\ \left|\,|x|-3\,\right|\geq 3$

خطوات الحل

$\Leftarrow or \Rightarrow$

$\lvert x\rvert-3\geq 3$	$\lvert x\rvert-3\leq -3$
$+3\quad +3$	$+3\quad +3$
$\lvert x\rvert\geq 6$	$\lvert x\rvert\leq 0$
$x\geq 6$ or $x\leq -6$	$x=0$



$$S.S=(-\infty,-6]\cup\{0\}\cup[6,\infty)$$

Question(2)

A). Find the domain of each of the following:

$i).\ M(x)=5-(x+1)^2$

خطوات الحل

since: $M(x)$ is polynomial function .

;so $D_M=\mathbb{R}$

$ii).\ s(x)=4\sec(2x)$

خطوات الحل

since: $\sec 2x=\frac{1}{\cos 2x}$

$\cos 2x=0$

$2x=\frac{\pi}{2}+n\pi \quad ;\forall n\in\mathbb{Z}$

$x=\frac{\pi}{4}+\frac{\pi}{2}n$

;so $D_s=\mathbb{R}-\left\{\frac{\pi}{4}+\frac{\pi}{2}n\right\} \quad ;\forall n\in\mathbb{Z}$

B). Let $f(x)=\frac{1}{x}$, $g(x)=\frac{\sqrt{3}}{x^2-1}$ .Find

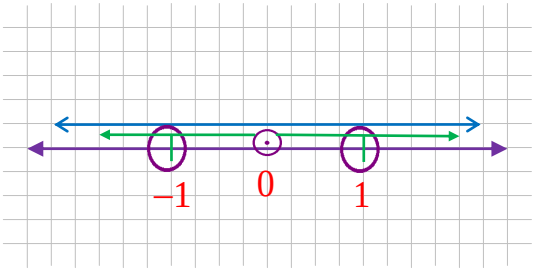
i). The rule $(g/f)(x)$. ii). $D_{g/f}$. iii). The rule $(f\circ f)(x)$.

خطوات الحل

i). The rule $\left(\frac{g}{f}\right)x=\frac{g(x)}{f(x)}=\frac{\frac{\sqrt{3}}{x^2-1}}{\frac{1}{x}}=\frac{\sqrt{3}x}{x^2-1}$

ii). $D_{\left(\frac{g}{f}\right)}$

D_g :	D_f :
$x^2-1=0$	$x=0$
$x=\pm 1$	$D_f=\mathbb{R}-\{0\}$
$D_g=\mathbb{R}-\{\pm 1\}$	



$D_{\left(\frac{g}{f}\right)}=D_g\cap D_f-\{f(x)=0\}$

$=(-\infty,-1)\cup(-1,0)\cup(0,1)\cup(1,\infty)$

$=\mathbb{R}-\{-1,0,1\}$

iii). The rule $(f\circ f)(x)=f\left(f(x)\right)$

$=f\left(\frac{1}{x}\right)=\frac{1}{\frac{1}{x}}=x \quad ;x\neq 0$

Question(3)

A). Determine whther the functions $f(x)=x^2-2x+7,\ x\le 1$ is one-to-one or not .

خـطوات الحـــل

$f(x)=(x-1)^2+6$

$v=(1,6)$

suppose $f(x_1)=f(x_2)\quad ;\forall x_1,x_2\in(-\infty,1]$

$(x_1-1)^2+\not{6}=(x_2-1)^2+\not{6}$

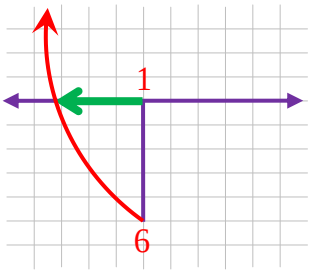
$(x_1-1)^2=(x_2-1)^2$ $\boxed{\text{to }\sqrt{\ }}$

$|x_1-1|=|x_2-1|$ but $x_1,x_2\in(-\infty,1]$

$-(x_1-1)=-(x_2-1)$

$-x_1+\not{1}=-x_2+\not{1}$

$\because x_1=x_2\quad \therefore f(x)$ is (1-1)



B). Given that the functions $f(x)=\frac{2x+1}{x+5}$ is one-to-one function .

1). Find the inverse of f . 2). Find the range of f .

خـطوات الحـــل

i)since $f(x)$ is (1-1)

so , it has inverse

[1] put $y=f(x)$ $\boxed{\text{replace } \begin{matrix} y \text{ to } x \\ x \text{ to } y \end{matrix}}$

[2] $y=\frac{2x+1}{x+5}$

$x=\frac{2y+1}{y+5}$

[3] $x\ y+5x=2y+1$ ضرب مقص

$x\ y-2y=-5x+1$

$(x-2)y=-5x+1$

$y=\frac{-5x+1}{x-2}$

$f^{-1}(x)=\frac{-5x+1}{x-2}$

$ii)\ R_f=D_{f^{-1}}$

$f^{-1}(x)=\frac{-5x+1}{x-2}$

$x-2=0\quad x=2$

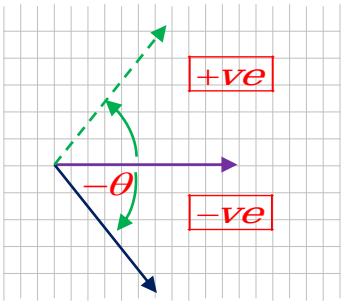
$D_{f^{-1}}=\mathbb{R}-\{2\}$

$R_f=D_{f^{-1}}=\mathbb{R}-\{2\}$

Question(4)

A). Let ϕ be an angle in standard position, where its rotation is counterclockwise, with arec length 90 cm, and the diameter of the circle is 20 cm.
Determine the angle ϕ in degree.

خطوات الحل



$$\phi = \frac{s}{r}$$

$$\begin{boxed} S=90 \\ 2r=20 \\ r=10 \end{boxed}$$

حولها بالحاسبة الي دراجات

$$= \frac{90}{10} \cdot \frac{180}{\pi} \simeq 515.662$$

$$\phi \simeq 515.662 - 360 \simeq 155.662$$

in standard position

B). Find the reference angle of -120°.

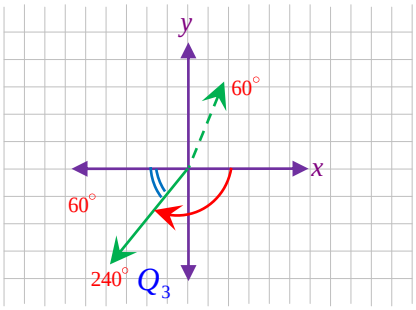
خطوات الحل

(1) $\theta = -120^\circ \notin [0,360]$

(2) convert $\theta = 360 - 120 = 240^\circ$

(3) θ lies in Q_3

Figure الرسم (4)



$\theta' = 240 - 180 = 60^\circ$ نستخدم (5)

C). Solve the equation $\cos(2x) = \sin x, \quad x \in [0,\pi]$
Without using calculator

خطوات الحل

$$1 - 2\sin^2 x = \sin x$$

$$2\sin^2 x + \sin x - 1 = 0$$

$$(2\sin x - 1)(\sin x + 1) = 0$$

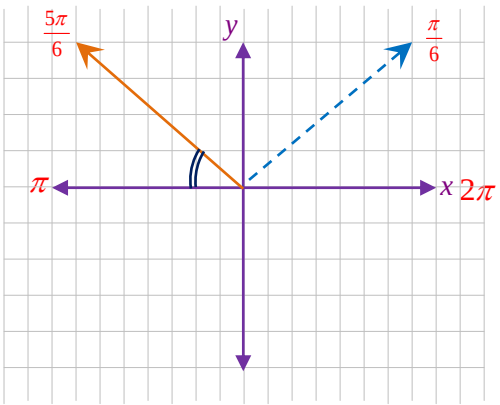
$2\sin x - 1 = 0$ | $\sin x + 1 = 0$

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

lies in $Q_{1,2}$ | $x = \frac{3\pi}{2} \notin [0,\pi]$

$x = \frac{\pi}{6}, \frac{5\pi}{6}$

$$S.S = \left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\}$$



D). Verify the identity:

$$\sin x \cdot \cos y = \frac{1}{2}[\sin(x+y) + \sin(x-y)]$$

خطوات الحل

$$R.H.S. = \frac{1}{2}[\sin x \cos y + \cos x \sin y + \sin x \cos y - \cos x \sin y]$$

$$= \frac{1}{2}[2\sin x \cos y] = \sin x \cos y = L.H.S$$