بسم الله الرحمن الرحيم

محاضرات في ريض ١٠١ جامعة الملك سعود

حل الميد الاول ٤٠/٤١ math(101)

قروبات القمة تتقدم بكل الشكر للبشمهندس أسامة المسند

عبدالله الحفني جوال ٠٥٨٣٤٢٢٢٠٠

بسم الله الرحمن الرحيم

المحاضرة تتكلم عن حل اختبار ميدتيرم ١٤٤١ دراسي ثان .(١)

Question(1)

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

$$\left\{\sqrt[3]{-8},\frac{3.17}{6},\left(\sqrt[3]{2}\right)^8,\left(\sqrt{2}+\sqrt{5}\right)^2,1.\overline{34},\sqrt{5+\sqrt{16}},\csc\left(\frac{\pi}{6}\right),\frac{\pi}{2}\right\}$$

خطوات الحل

(i) rational $\left\{\sqrt[3]{-8},\frac{3.17}{6},1.\overline{34},\sqrt{5+\sqrt{16}},\csc\left(\frac{\pi}{6}\right)\right\}$

(ii) Irrational $\left\{\left(\sqrt[3]{2}\right)^8,\left(\sqrt{2}+\sqrt{5}\right)^2,\frac{\pi}{2}\right\}$

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

$\boxed{1}$ $4+3(2x-1)\geq x+2$

خطوات الحل

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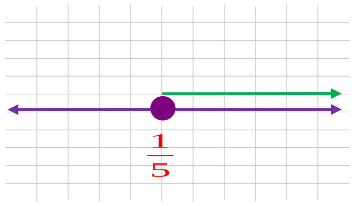
$$4+6x-3\geq x+2$$

$$6x-x\geq 2-1\Rightarrow\frac{5x}{5}\geq\frac{1}{5}$$

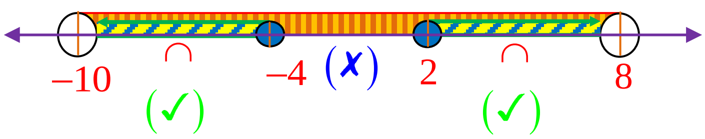
$$x\geq\frac{1}{5}$$

$$S.S=\left[\frac{1}{5},\infty\right)$$



$\boxed{2}$ $3\leq|x+1|<9$

خطوات الحل



$\Leftarrow and \Rightarrow$

$|x+1|\geq 3$

$\Leftarrow or \Rightarrow$

$x+1\geq 3$ $\qquad$ $x+1\leq -3$

$x\geq 2$ $\qquad$ $x\leq -4$

$|x+1|<9$

$-9<x+1<9$

$-10<x<8$

$$S.S=(-10,-4]\cup[2,8)$$

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Question(2)

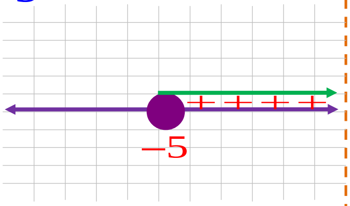
A) Find the domain of each of the following :

$\boxed{i}$ $k(x) = \sqrt{x+5}$

خطوات الحل

$$x+5 \geq 0 \Rightarrow x \geq -5$$

$$D_f = [-5, \infty)$$



$\boxed{ii}$ $h(x) = \dfrac{2x}{\csc(4x)}$

خطوات الحل

$$\csc 4x = 0 \Rightarrow \sin 4x = 0$$

$$\Rightarrow 4x = n\pi$$

$$x = \frac{n\pi}{4} \quad ; \quad \forall n \in \mathbb{Z}$$

$$D_h = \mathbb{R} - \left\{\frac{n\pi}{4}\right\}$$

B). Let $f(x) = \cos x$, $g(x) = x^2 + 5$, Find:

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

خطوات الحل

$\boxed{(i)}$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{\cos x}{x^2+5}$$

$\boxed{(ii)}$

$D_f = (-\infty, \infty)$ becouace $\forall x \in (-\infty, \infty)$ $\cos x$ is definition.

$D_g = (-\infty, \infty)$ becouace $x^2 + 5 = 0$ $S.S = \phi$

$$D_{f/g} = D_f \cap D_g = (-\infty, \infty) \text{ or } \mathbb{R}$$

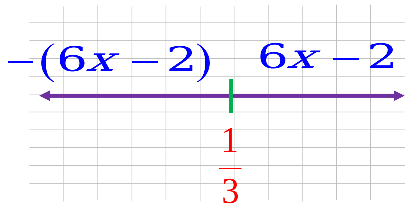
$\boxed{(iii)}$ $(g \circ f)(x) = g(\cos x)$

$$\therefore g(f(x)) = \cos^2 x + 5$$

C). Rewrite The Experession $|6x-2|$,without the absolute value.

خطوات الحل

$$\text{the absolute value } |6x-2| = \begin{cases} 6x-2; & x \geq \frac{1}{3} \\ 2-6x; & x < \frac{1}{3} \end{cases}$$



$$6x - 2 = 0 \Rightarrow 6x = 2 \quad , \quad x = \frac{1}{3}$$

Question(3)

A). Determine algebraically whether the function $f(x)=x^2+6x+4,\ x\ge -6$ is one-to-one or not .

خطوات الحل

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cheek: $h=\frac{-6}{2}=-3>-6$ Not one-to-one

suppes $f(x_1)=f(x_2)\ \forall x_1,x_2\in D_f\ [-6,\infty)$

$x_1^2+6x_1+9+\cancel{4}=x_2+6x_2+9+\cancel{4}$

$(x_1+3)^2=(x_2+3)^2$ $\boxed{\text{to } \sqrt{\ }}$

$at: x\ge -3$	$at: x\ge -6$
$x_1+\cancel{3}=x_2+\cancel{3}$	$x_1+3=-x_2-3$
$x_1=x_2$	$x_1=-x_2-6$

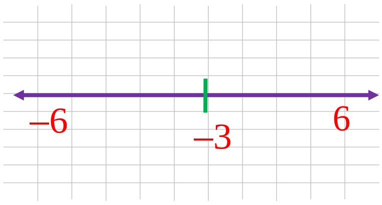
$f(x)$ is Not (1-1)

Another technique

$f(-6)=f(6)=4$

but $-6\ne 6$

Not (1-1)



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B). Given that the function $f(x)=\frac{4}{x+2}$ is one-to-one .

i) Find the inverse of f ii) Find the range of f

خطوات الحل

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

so , it has inverse $\forall x\ne -2$

put $y=f(x)$ $\quad y=\frac{4}{x+2}$

$\boxed{\text{replace } y \text{ to } x,\ x \text{ to } y}$

$x=\frac{4}{y+2}\Rightarrow xy+2x=4$

$xy=4-2x\quad (\div x);x\ne 0$

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

$put\ y=f^{-1}(x)$

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

$(ii)\ D_{f^{-1}}: x=0\Rightarrow D_{f^{-1}(x)}=\mathbb{R}-\{0\}$

$R_f=D_{f^{-1}(x)}=\mathbb{R}-\{0\}$

Another technique

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

so , it has inverse $\forall x\ne -2$

$\boxed{\text{replace } x \text{ to } f^{-1}(x),\ f(x) \text{ to } x}$

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

$xf^{-1}(x)=4-2x\quad (\div x);x\ne 0$

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

$(ii)\ D_{f^{-1}}: x=0\Rightarrow D_{f^{-1}(x)}=\mathbb{R}-\{0\}$

$R_f=D_{f^{-1}(x)}=\mathbb{R}-\{0\}$

Question(4) *A)*.Find the exact value of each of the following ,without using calculator.

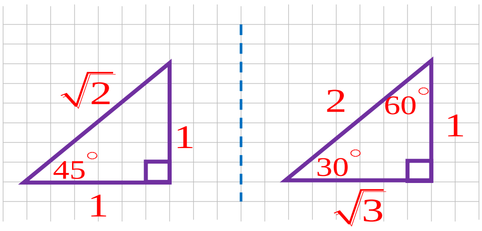
$\boxed{i}$ $\cos(75^\circ)$

خـــطوات الحـــل

$ans.\cos(75^\circ)=\cos(45^\circ+30^\circ)$

$=\cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ$

$=\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}-\frac{\sqrt{2}}{2}\cdot\frac{1}{2}=\frac{\sqrt{6}-\sqrt{2}}{4}$



Another technique

$ans.\cos(75^\circ)=\cos(90^\circ-15^\circ)$

$=\sin 15^\circ=\sin(60^\circ-45^\circ)$

$=\sin 60^\circ \cos 45^\circ - \cos 60^\circ \sin 45^\circ$

$=\frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}-\frac{1}{2}\cdot\frac{\sqrt{2}}{2}=\frac{\sqrt{6}-\sqrt{2}}{4}$

$\boxed{ii}$ $\sin^{-1}\left(\sin\left(\frac{4\pi}{3}\right)\right)$

خـــطوات الحـــل

Let $\alpha=\sin\left(\frac{4\pi}{3}\right)$; $\alpha\in[-1,1]$

$\frac{4\pi}{3}$ lies in $Q._3$

$\theta'=\frac{4\pi}{3}-\pi=\frac{\pi}{3}$

$\alpha=\sin\left(\frac{4\pi}{3}\right)=-\frac{\sqrt{3}}{2}$ using the figure

put $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)=\theta\in\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

$\sin\theta=-\frac{\sqrt{3}}{2}$

$\theta=-\frac{\pi}{3}$

from properties of the shabe

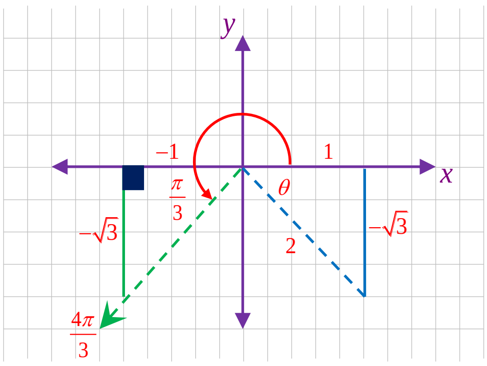
$\sin^{-1}\sin\left(\frac{4\pi}{3}\right)=-\frac{\pi}{3}$

Another technique

such that $\frac{4\pi}{3}$ lies in $Q._3$

using Rule $\theta-2\pi$ lies in $Q._4$

$\sin^{-1}\sin\left(\frac{4\pi}{3}-2\pi\right)=\cancel{\sin^{-1}}\cancel{\sin}\left(-\frac{\pi}{3}\right)=-\frac{\pi}{3}\in\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$



$\boxed{iii}$ $\sin\left(\cos^{-1}\left(\frac{-1}{2}\right)+\tan^{-1}(1)\right)$

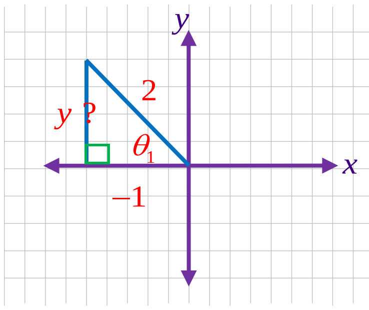
خطوات الحل

$let\ \theta_1=\cos^{-1}\left(-\frac{1}{2}\right)$ lies in $Q_{(2)}$

$\cos\theta_1=-\frac{1}{2}$ $\sin\theta_1=\frac{\sqrt{3}}{2}$

$y=\sqrt{(2)^2-(-1)^2}$

$y=\sqrt{3}$

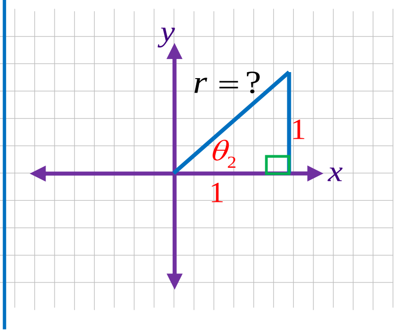


$let\ \theta_2=\tan^{-1}(1)$ lies in $Q_{(1)}$

$\tan\theta_2=1$

$\sin\theta_2=\frac{\sqrt{2}}{2}$ $\cos\theta_2=\frac{\sqrt{2}}{2}$

$r=\sqrt{1+1}=\sqrt{2}$



$\sin(\theta_1+\theta_2)=\sin\theta_1\cos\theta_2+\cos\theta_1\sin\theta_2$

$=\frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}-\frac{1}{2}\cdot\frac{\sqrt{2}}{2}=\frac{\sqrt{6}-\sqrt{2}}{4}$

Another technique

$let\ \theta_1=\cos^{-1}\left(-\frac{1}{2}\right)$ $,let\ \theta_2=\tan^{-1}(1)$

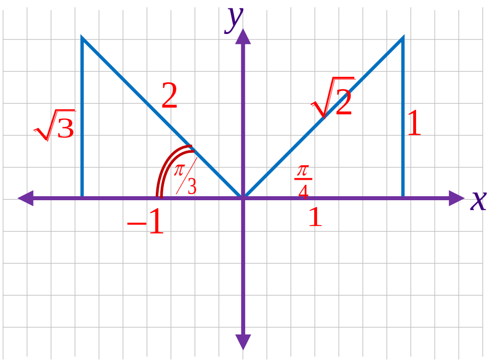
$\sin(\theta_1+\theta_2)$

$=\sin\left(\frac{2\pi}{3}+\frac{\pi}{4}\right)$

$=\sin\frac{2\pi}{3}\cos\frac{\pi}{4}+\cos\frac{2\pi}{3}\sin\frac{\pi}{4}$

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

$=\frac{\sqrt{6}}{4}-\frac{\sqrt{2}}{4}=\frac{\sqrt{6}-\sqrt{2}}{4}$



B). Verify that identity : $\frac{\cos\left(\frac{\pi}{2}-x\right)}{1-\cos^2 x}=\csc x$

خطوات الحل

NOTE

using

$\cos\left(\frac{\pi}{2}-\theta\right)=\sin\theta$

$L.H.S.=\frac{\sin x}{\sin^2 x}=\frac{1}{\sin x}$

$=\csc x=R.H.S.$

Another technique

$L.H.S=\frac{\cos\frac{\pi}{2}\cos x+\sin\frac{\pi}{2}\sin x}{\sin^2 x}=\frac{\cancel{0.\cos x}+1.\sin x}{\sin^2 x}$

$=\frac{\sin x}{\sin^2 x}=\frac{1}{\sin x}=\csc x=R.H.S.$

Another technique

$R.H.S.=\csc x=\frac{1}{\sin x}=\frac{1}{\sin x}\cdot\frac{\sin x}{\sin x}$

$=\frac{\sin x}{\sin^2 x}=\frac{\cos\left(\frac{\pi}{2}-\theta\right)}{1-\cos^2 x}$

$=L.H.S.$

كورسات جامعية

بسم الله الرحمن الرحيم

عبدالله الحفني ٠٥٨٣٤٢٢٢٠٠

للاتصال : 0583422200

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لحجز ودراسة الفصل الدراسي الثاني ٠٥٨٣٤٢٢٢٠٠

- السنه التحضيريه
- MATH(101)
- ريض ١٠١
- شرح المقرار
- الاسئله المهمة
- EXERCISES

مقرار MATH(101) جوال :٠٥٨٣٤٢٢٢٠٠

شرح شامل للكورس وفق خطة ١٤٤٠/١٤٤١

ما نقدمه لكم

شرح مميز تقنيات جديدة للشرح

(١) مذكرات شاملة تحتوي شرح المقرار

(٢) نحل Example المهمة EXERCISES طبقا للخطة

(٣) حل مسائل الواجبات

(٤) مذكرة ليلة الاختبار بها جميع افكار الكورس من A الي Z

(٥) مسائل الترك (جديد هذا الفصل)

(٦)حلول اسئلة الاختبارات السابقة

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