محاضرات في ريض ١٠١ جامعة الملك سعود

مع الحفني جوال: ٠٥٨٣٤٢٢٢٠٠

حل الميد الثانى ٣٩/٤٠ math(101)

كورس ريض ١٠١ عبدالله الحفني ٠٥٨٣٤٢٢٢٠٠

عبدالله الحفني جوال ٠٥٨٣٤٢٢٢٠٠

نقدم أقوى مراجعات ريض ١٠١ مراجعة A+ مع ليلة الامتحان تشمل علي جميع الاسئلة المتوقعة لهذا العام

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تحياتي لكم جميعا عبدالله الحفني

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عبدالله الحنفي جوال ٠٥٨٣٤٢٢٢٠٠

إجابة وشرح المبد الثانى للعام ١٤٣٩-١٤٤٠
ريض ١٠١

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Question(1)

A). Use the graph below of a function f to answer the follwing:

$\boxed{1}$ $\lim_{x\to3} f(x)$

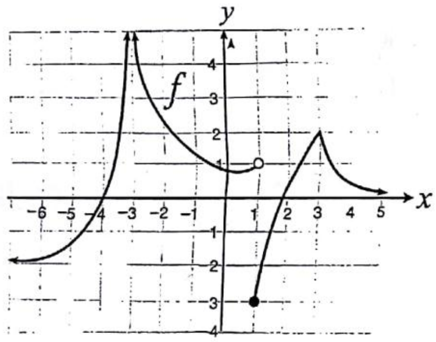
خطوات الحل

$$\left.\begin{aligned}\lim_{x\to3^+} f(x)&=2\\ \lim_{x\to3^-} f(x)&=2\end{aligned}\right\}\lim_{x\to3} f(x)=2$$

$\boxed{2}$ $\lim_{x\to1} f(x)$

خطوات الحل

$$\left.\begin{aligned}\lim_{x\to1^+} f(x)&=-3\\ \lim_{x\to1^-} f(x)&=1\end{aligned}\right\}\neq D\cdot N\cdot E$$



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$\boxed{3}$ Find the vertical asymptotes and horizontal asymptotes of f

خطوات الحل

$$(i)\ V\cdot A \text{ at} : \text{x} = -3\left\{\begin{aligned}\lim_{x\to-3^+} f(x)&=\infty\\ \lim_{x\to-3^-} f(x)&=\infty\end{aligned}\right.$$

$$(ii)\ H\cdot A \text{ at}\left\{\begin{aligned}y=-2&\Rightarrow\lim_{x\to-\infty} f(x)=-2\\ y=0&\Rightarrow\lim_{x\to\infty} f(x)=0\end{aligned}\right.$$

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$\boxed{4}$ Determine the $x-$ coordinats (s) in domain of f

at which the function is not differentiable.

خطوات الحل

$$D_f=(-\infty,-3)\cup(-3,1]\cup[1,\infty)$$

$$\text{not Diff}\ \begin{matrix}\text{at:}x=1\\ \text{at}:x=3\end{matrix}\quad\text{because cusp}$$

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B). Use the definition of the limit to prove that: $\lim_{x\to 1}(3x+2)=5$

خطوات الحل

Assume $\varepsilon>0$ we are going to find $\delta>0$

نحدد

$a=1$

$f(x)=3x+2$

$L=5$

$|3x+2-5|<\varepsilon$

$|3x-3|<\varepsilon$

$3|x-1|<\varepsilon$

$|x-1|<\dfrac{\varepsilon}{3}$

let $\varepsilon>0,\delta>0$

$0<|x-1|<\delta$

$|x-1|<\delta$

tack $\delta=\dfrac{\varepsilon}{3}$

Question(2) Evaluate the following limits (if exists):

1 $\lim_{x\to 0}(4x+5)^2$

خطوات الحل

$$\left[\lim_{x\to 0}4x+5\right]^2=(5)^2=25$$

2 $\lim_{x\to 4}\dfrac{\sqrt{x+5}-3}{x-4}\quad\left(\dfrac{0}{0}\right)$

خطوات الحل

$$\lim_{x\to 4}\frac{\sqrt{x+5}-3}{x-4}\cdot\frac{\sqrt{x+5}+3}{\sqrt{x+5}+3}$$

$$=\lim_{x\to 4}\frac{(x+5)-9}{(x-4)\sqrt{x+5}+3}$$

$$=\lim_{x\to 4}\frac{\cancel{(x-4)}}{\cancel{(x-4)}\sqrt{x+5}+3}$$

$$=\lim_{x\to 4}\frac{1}{\sqrt{x+5}+3}=\frac{1}{6}$$

3 $\lim_{x\to 0}\dfrac{\sin(2x)+\tan(4x)}{x}$

خطوات الحل

$$\lim_{x\to 0}\frac{\sin 2x}{x}+\lim_{x\to 0}\frac{\tan 4x}{x}$$

$$=2+4=6$$

4 $\lim_{x\to\infty}\dfrac{\sin^2 x}{x^2+1}$

خطوات الحل

using $S\cdot T\cdot$

$0\le\sin^2 x\le 1\qquad\boxed{(\div)\,x^2+1}$

$$\frac{0}{x^2+1}\le\frac{\sin^2 x}{x^2+1}\le\frac{1}{x^2+1}$$

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

$$\lim_{x\to\infty}\frac{\sin^2 x}{x^2+1}=0$$

Question(3)

A). Use the intrmediate value theorem to show that function: $f(x)=\dfrac{-4x+2}{x+3}$ Has a zero in $[-1,1]$.

خطوات الحل

$$f(x)=\frac{-4x+2}{x+3};\ x\neq -3\notin[-1,1]$$

$f(x)$ is cont $\in[-1,1]$

$$f(-1)=\frac{-4(-1)+2}{-1+3}=3>0$$

$$f(1)=\frac{-4(1)+2}{1+3}=-\frac{1}{2}<0$$

$$-\frac{1}{2}<0<3$$

Using $\boldsymbol{I.V.T}$ then exist at least $c\in[-1,1]\Rightarrow f(c)=0$

B). Use the definition of the derivative to find: f' of $f(x)=x^2$.

خطوات الحل

$$f'(x)=\lim_{h\to0}\frac{f(x+h)-f(x)}{h}$$

$$=\lim_{h\to0}\frac{(x+h)^2-x^2}{h}$$

$$=\lim_{h\to0}\frac{\cancel{x^2}+2xh+h^2-\cancel{x^2}}{h}$$

$$=\lim_{h\to0}\frac{2xh+h^2}{h}=\lim_{h\to0}\frac{\cancel{h}(2x+h)}{\cancel{h}}=2x$$

Note

$(a+b)^2=a+2ab+b^2$

C). Find an equation for the tangent line $f(x)=x+3\cos x$ at $x=\dfrac{\pi}{2}$.

خطوات الحل

$$f'(x)=1-3\sin x$$

$$m=f'\left(\frac{\pi}{2}\right)=1-3\sin\frac{\pi}{2}=-2$$

$$y=m(x-a)+f(a)$$

$$=-2\left(x-\frac{\pi}{2}\right)+\frac{\pi}{2}$$

$$=-2x+\pi+\frac{\pi}{2}$$

$$y=-2x+\frac{3\pi}{2}$$

$a=\dfrac{\pi}{2}$

$f(a)=f\left(\dfrac{\pi}{2}\right)=\dfrac{\pi}{2}$

$m=-2$

Question(4)

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

$\boxed{1}$ $f(x)=x^3+4x^2+5x+2$

خطوات الحل

$$f'(x)=3x^2+8x+5$$

$\boxed{2}$ $f(x)=\dfrac{x^2-7}{x+5}$

خطوات الحل

$$f'(x)=\frac{2x(x+5)-(x^2-7)}{(x+5)^2}$$

$$=\frac{2\cancel{x^2}+10x-\cancel{x^2}+7}{(x+5)^2}$$

$$=\frac{x^2+10x+7}{(x+5)^2}$$

$\boxed{3}$ $f(x)=\cos x\sin x$

خطوات الحل

$$f(x)=\frac{1}{2}\sin 2x$$

$$f'(x)=\frac{1}{\cancel{2}}\cdot\cancel{2}\cos 2x$$

$$=\cos 2x$$

B).Find the values of a,b and c such that $f(x)=\begin{cases} ax^2+bx+3c & , \quad x>1 \\ 5ax^2+bx+3c-2 & , \quad x=1 \\ 5ax^3+bx^2+c & , \quad x<1 \end{cases}$

Is differentiable at $x=1$.

خطوات الحل

F is diff at $x=1$

Cont at $x=1$

$f(1)=\lim\limits_{x\to 1^+} f(1)---\boxed{1}$

$5a+\cancel{b}+\cancel{3c}-2=a+\cancel{b}+\cancel{3c}$

$4a=2\Rightarrow \boxed{a=\frac{1}{2}}$

$f(1)=\lim\limits_{x\to 1^-} f(1)---\boxed{2}$

$15a+2b=2a+b$

$\cancel{5a}+\cancel{b}+3c-2=\cancel{5a}+\cancel{b}+c$

$2c=2$, $c=1$

$f'_-(1)=f'_+(1)$

$15a+2b=2a+b$

$2b-b=2a-15a$

$b=-13a$

$b=-13\left(\frac{1}{2}\right)$

$\boxed{b=\frac{-13}{2}}$

$5ax^2+bx+3c-2$

$f: 5ax^3+bx^2+c$ | $ax^2+bx+3c$

1^- 1^+

1

$10ax+b$

$f': 15ax^2+2bx$ | $2ax+b$

$(1^-)'$ $(1^+)'$

1