



اللجنة الأكاديمية للهندسة المدنية

اسئلة سنوات

كالكولاس 1

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أسئلة صعبة
على موضوع Domain

Q1 Find the domain of $f(x) = \ln(4x+1) + 3$??

Solution :-

$$4x+1 \geq 0$$

$$4x \geq -1$$

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

$$\left(-\frac{1}{4}, \infty\right)$$

Q2 Find the domain of $f(x) = \sin \sqrt{32 - 2x^2}$?

Solution :-

$$32 - 2x^2 \geq 0$$

$$32 \geq 2x^2$$

$$\frac{32}{2} \geq \frac{2x^2}{2}$$

$$16 \geq x^2$$

$$4 \geq |x|$$

$$-4 \leq x \leq 4$$

$$[-4, 4]$$

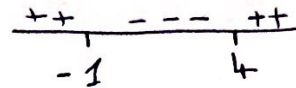
Q3 Find the domain of $f(x) = \sqrt{x^2 - 3x - 4}$?

Solution:- $x^2 - 3x - 4 \geq 0$

$(x - 4)(x + 1) \geq 0$

$x = 4$

$x = -1$



*) نكتب الإشارات
في خلال التكوين

$(-\infty, -1] \cup [4, \infty)$

Q4 Find the domain of the $f(x) = \sqrt{\frac{x^2 + 6x + 9}{x}}$?

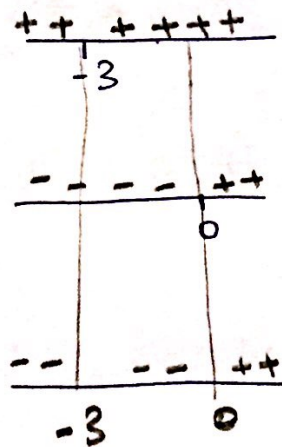
$\frac{x^2 + 6x + 9}{x} \geq 0$

$x^2 + 6x + 9 = 0$

$(x + 3)^2 = 0$

$x = -3$

$x = 0$



$(0, \infty)$

Q5 Find the domain of $f(x) = \frac{x+1}{\ln(1-2x)}$?

Solution :- $1-2x > 0$
 $x < \frac{1}{2}$

$$(-\infty, 0.5) - \{0\}$$

Q6 Find the domain $(g \circ f)(x)$ IF $f(x) = \sqrt{x}$

$g(x) = \sqrt{1-x}$??

Solution :- $g(f(x)) = \sqrt{1-f(x)} = \sqrt{1-\sqrt{x}}$

$$1-\sqrt{x} \geq 0$$

$$1 \geq \sqrt{x}$$

$$1 \geq x$$

$$(-\infty, 1]$$

Domain $f(x) = [0, \infty)$

$$[0, \infty) \cap (-\infty, 1]$$

$$= [0, 1]$$

Q7 Find the domain of the $f(x) = \frac{\ln(x-1)}{\sqrt{4-x^2}}$?

Solution :- $x-1 > 0$ | $4-x^2 > 0$
 $x > 1$ | $4 > x^2$
 $(1, \infty)$ | $2 > |x|$

$$(-2, 2)$$

$$(1, \infty) \cap (-2, 2)$$

$$(1, 2)$$

Q8 Find the domain of the $f(x) = 5\sqrt{-2x} - 2\sqrt{x}$?

Solution :-

$-2x \geq 0$ $x \leq 0$ $(-\infty, 0]$	$x \geq 0$ $[0, \infty)$	$(-\infty, 0] \cap [0, \infty)$ 0
--	-----------------------------	--

Q9 Find the Range of the $f(x) = \frac{3-2x}{x-2}$?

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

$^{-1}$
 $D f(x) =$

$\mathbb{R} - \{-2\}$

Q10 The domain of $f(x) = \frac{\sqrt{x-1}}{\sqrt{x-2}}$?

$\sqrt{x-1} \rightarrow$	$x-1 \geq 0$ $[1, \infty)$	$[1, \infty) \cap (2, \infty)$ (2, ∞)
$\sqrt{x-2} \rightarrow$	$x-2 > 0$ $(2, \infty)$	

Q11 the range of $f(x) = 2\sin^2(x)$??

Solution $\Rightarrow -1 \leq \sin(x) \leq 1$

$$0 \leq \sin^2(x) \leq 1$$

$$0 \leq 2\sin^2(x) \leq 2$$

$$\boxed{[0, 2]}$$

Q12 Given that $(f \circ g)(x) = 2x^2 - 5x + 1$

Solution $\Rightarrow g(x) = 3x - 2$ find $f(4)$??

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

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

$$3x - 2 = 4$$

$$x = 2$$

$$\boxed{-1}$$

Q13 If $f(x) = \frac{x}{x-1}$ then $f^{-1}(x)$?

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

$$yx - y = x$$

$$yx - x = y$$

$$x(y-1) = y$$

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

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

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

Q14

$$\text{If } f(x) = -x^2 + 4x \quad x \leq 2$$

then find $f^{-1}(x)$?

Solution $\Rightarrow$

$$y = -x^2 + 4x$$

$$-y = x^2 - 4x$$

$$-y = x^2 - 4x + 4 - 4$$

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

$$\sqrt{4 - y} + 2 = x$$

$$y = \sqrt{4 - x} + 2$$

-1

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

Q15

Is $f(x) = 1 + 2\cos(x)$ even function??

Solution $\Rightarrow$

$$f(-x) = 1 + 2\cos(-x)$$

$\downarrow$

$$1 + 2\cos(x)$$

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

even function

Q16

Let $f(x) = x^3 + 4x + 1$ then if

$$f^{-1}(c^3) = c \quad \text{then } c = ??$$

$$\text{Solution } \Rightarrow f(c) = c^3$$

$$c^3 + 4c + 1 = c^3$$

$$4c = -1$$

$$c = -\frac{1}{4}$$

Q17 Find the domain of the $f(x) = \sqrt{|3-x| - 5}$?

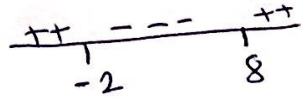
Solution $\Rightarrow |3-x| = 5$

$$3-x = 5$$

$$x = -2$$

$$3-x = -5$$

$$x = 8$$



$$(-\infty, -2] \cup [8, \infty)$$

Q18 Find the range of $f(x) = \sqrt{x-5} + 2$?

$$D f(x) = [5, \infty)$$

$$R f(x) = [2, \infty)$$

↪ عوض 5 في $f(x)$
فإن أقل ناتج 2

Q19 The function $f(x) = e^{(2+x)} - e^{(2-x)}$ is

symmetric about the ??

Solution $\Rightarrow$

$$\begin{aligned} f(-x) &= e^{2-x} - e^{2+x} \\ &= - (e^{2+x} - e^{2-x}) \end{aligned}$$

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

odd

Q20 Find $\tan\left(\frac{5\pi}{6}\right)$?

Solution $\Rightarrow$

$$\frac{5 \times 180}{6} = 150 \text{ راجع ثاني}$$

$$180 - 150 = 30$$

$$\boxed{-\frac{\sqrt{3}}{3}}$$

Q21 Find $\cos^{-1}\left(\cos \frac{11\pi}{6}\right)$?

Solution $\Rightarrow$

$$\frac{11 \times 180}{6} = 330 \text{ راجع رابع}$$

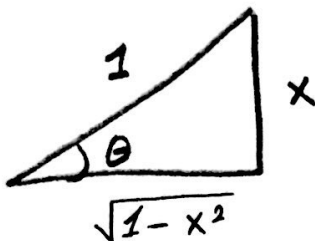
$\rightarrow$ المباشرة $\oplus$

$$360 - 330 = 30$$

$$\cos(30) = \frac{\sqrt{3}}{2}$$

$$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = 30 = \boxed{\frac{\pi}{6}}$$

Q22 Find $\tan(\sin^{-1}(x))$?



$$\tan(\theta) = \boxed{\frac{x}{\sqrt{1-x^2}}}$$

Q23

$$\text{If } f(x) = 3x - 5$$

$$(f \circ g)(x) = 12x^2 - 6x + 13$$

then $g(0)$?

$$f(g(x)) = 12x^2 - 6x + 13$$

$$3g(x) - 5 = 12x^2 - 6x + 13$$

$$3g(0) - 5 = 13$$

$$g(0) = \frac{18}{3} = \boxed{6}$$

Q24

Let $3e^{4x} = 1$ then the

value of x is ??

$$3e^{4x} = 1$$

$$e^{4x} = \frac{1}{3}$$

$$\ln e^{4x} = \ln \frac{1}{3}$$

$$4x = \ln \frac{1}{3}$$

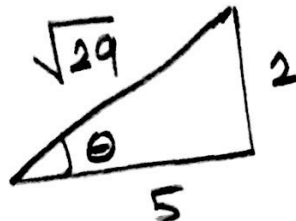
$$x = \frac{1}{4} \ln \left(\frac{1}{3} \right) = -\frac{1}{4} \ln(3)$$

Q27 Find $\sin \left(2 \tan^{-1} \left(\frac{2}{5} \right) \right)$?

Solution $\Rightarrow \sin \left(2 \underbrace{\tan^{-1} \left(\frac{2}{5} \right)}_{\theta} \right) = \sin(2\theta)$

$\sin(2\theta) = 2 \sin \theta \cos \theta = 2 \sin \left(\tan^{-1} \left(\frac{2}{5} \right) \right) \cos \left(\tan^{-1} \left(\frac{2}{5} \right) \right)$

$2 * \frac{2}{\sqrt{29}} * \frac{5}{\sqrt{29}}$



$\frac{20}{29}$

Q28 Find the range of the $f(x) = \sqrt{4 - \sqrt{x}}$??

Solution $\Rightarrow$

نخرج المجال أولاً

$4 - \sqrt{x} \geq 0$

$4 \geq \sqrt{x}$

$x \leq 16$

$[0, 16]$

نحفظ القيمتي
في $f(x)$

Range = $[0, 2]$

Q25

Find the value of x ?

$$e^{2x} - 5e^x = -6$$

نفرض $y = e^x$

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

$$y^2 - 5y + 6 = 0$$

$$(y - 3)(y - 2)$$

$$y = 3$$

$$y = 2$$

$$e^x = 3$$

$$e^x = 2$$

$$\ln e^x = \ln 3$$

$$x = \ln 3$$

$$x = \ln 2$$

Q26

$$\text{If } \ln(x^2 - 3x - 16) - \ln(3x) = 0$$

then $x = ??$

$$\ln\left(\frac{x^2 - 3x - 16}{3x}\right) = 0$$

$$x^2 - 3x - 16 = 3x$$

$$x^2 - 6x - 16 = 0$$

$$(x - 8)(x + 2)$$

$$x = 8$$

$$x = -2$$

عوضنا في السؤال
لأن تحويل (-2) سيكون
داخل $\ln$ سالب
وهذا مرفوض

Q 29 If Domain $f(x) = [1, 4]$ then domain
Solution $\Rightarrow f(3x+4)$ is ??

$$1 \leq 3x+4 \leq 4$$

~~$$0 \leq 3x \leq 3$$~~

$$-3 \leq 3x \leq 0$$

$$-1 \leq x \leq 0$$

$$\boxed{[-1, 0]}$$

Q 30 The range of $f(x) = \frac{5}{3 - \cos(2x)}$??

Solution $\Rightarrow$

$$-1 \leq \cos(x) \leq 1$$

$$-1 \leq \cos(2x) \leq 1$$

$$1 \geq -\cos(2x) \geq -1$$

$$4 \geq 3 - \cos(2x) \geq 2$$

$$\frac{5}{4} \leq \frac{5}{3 - \cos(2x)} \leq \frac{5}{2}$$

$$\boxed{\left[\frac{5}{4}, \frac{5}{2} \right]}$$

Q31 Is $f(x) = \frac{x^2 \sin(x^2)}{\cos(x)}$ odd or even?

Solution $\Rightarrow$

$$f(-x) = \frac{(-x)^2 \sin(-x)^2}{\cos(-x)} = \frac{x^2 \sin^2 x}{\cos(x)}$$

$$f(-x) = f(x) = \text{Even function}$$

Q32 Find $\log_2 18 + \log_2 48 - \log_2 24$?

Solution $\Rightarrow$

$$\log_2 \left(\frac{18 \times 48}{24} \right) = \log_2 32 = \log_2 2^5 = 5$$

Q34

Find the value of x ?

$$\frac{e^x + e^{-x}}{2} = 1$$

$$e^x + e^{-x} = 2$$

$$\frac{e^x}{1} + \frac{1}{e^x} = 2$$

$$~~\frac{e^x}{1}~~ \quad e^{2x} + 1 = 2e^x$$

$$\text{Let } y = e^x$$

$$y^2 - 2y + 1 = 0$$

$$y = 1 \quad e^x = 1$$

$$x = 0$$

Q35

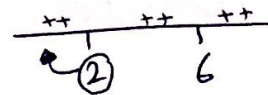
Find

$$\lim_{x \rightarrow 2} \frac{|x^2 - 8x + 12|}{2 - x}$$

??

$$= \frac{0}{0}$$

$$\lim_{x \rightarrow 2} \frac{(x-6)(x-2)}{(2-x)}$$



$$= 4$$

Q36 Find the $\lim_{x \rightarrow 0} \frac{1}{x} \left(\frac{1}{x+2} - \frac{1}{2} \right) ??$

Solution $\Rightarrow$

$\lim_{x \rightarrow 0} \frac{1}{x} \left(\frac{2 - (x+2)}{2(x+2)} \right)$ رتب شغل المسؤال

$$\lim_{x \rightarrow 0} \left(\frac{-x}{2x(x+2)} \right) = \lim_{x \rightarrow 0} \frac{-1}{2(x+2)} = \boxed{-\frac{1}{4}}$$

Q37 Find the $\lim_{x \rightarrow 2} \left(\frac{x^2 - 4}{x^2 + 2x - 8} \right) ??$

Solution $\Rightarrow \frac{0}{0}$

$$\lim_{x \rightarrow 2} \frac{(x-2)(x+2)}{(x+4)(x-2)} = \frac{4}{6} = \boxed{\frac{2}{3}}$$

Q38 The value of $\lim_{x \rightarrow 0} \frac{|x|}{x} ??$

$= \frac{0}{0}$ $\frac{- - -}{0} \frac{+ + +}{+}$

$$\lim_{x \rightarrow 0^+} \frac{x}{x} = 1$$

d.n.e

$$\lim_{x \rightarrow 0^-} \frac{-x}{x} = -1$$

Q39 Find the $\lim_{x \rightarrow 0^-} \left(\frac{\sqrt{x+16}}{|x|} + \frac{4}{x} \right)$?

$$\frac{- - + +}{x}$$

$$\lim_{x \rightarrow 0^-} \left(\frac{4}{x} - \frac{\sqrt{x+16}}{x} \right) = \frac{0}{0}$$

$$\lim_{x \rightarrow 0^-} \frac{4 - \sqrt{x+16}}{x} * \left(\frac{4 + \sqrt{x+16}}{4 + \sqrt{x+16}} \right)$$

$$\lim_{x \rightarrow 0^-} \frac{16 - x - 16}{x(4 + \sqrt{x+16})} = \lim_{x \rightarrow 0^-} \frac{-1}{4 + \sqrt{x+16}} = \boxed{-\frac{1}{8}}$$

Q40 Find the $\lim_{x \rightarrow 3^+} \frac{\sqrt{x^2 - 6x + 9}}{x - 3}$? ?

$$= \frac{0}{0}$$

$$\lim_{x \rightarrow 3^+} \frac{\sqrt{(x-3)^2}}{x-3} = \lim_{x \rightarrow 3^+} \frac{|x-3|}{x-3} =$$

$$\frac{- +}{3^+}$$

$$\lim_{x \rightarrow 3^+} \left(\frac{x-3}{x-3} \right) = \boxed{1}$$

Q41

Find the

$$\lim_{x \rightarrow 1} \left(\frac{x^4 - 1}{x - 1} \right)$$

??

$$= \frac{0}{0}$$

$$\lim_{x \rightarrow 1} \frac{(x-1)(x+1)(x^2+1)}{(x-1)}$$

$$= \boxed{4}$$

Q42

Let

$f(x) =$

$$\begin{cases} \frac{1}{x+2} & x < -2 \\ x^2 - 5 & -2 < x < 3 \\ \sqrt{x+13} & x > 3 \end{cases}$$

Find:- $\lim_{x \rightarrow 3} f(x)$

??

$$\lim_{x \rightarrow 0} f(x)$$

$$\lim_{x \rightarrow 3} \sqrt{x+13} = 4$$

$$\lim_{x \rightarrow 3} x^2 - 5 = 4$$

$$\lim_{x \rightarrow 3} f(x) = 4$$

$$\lim_{x \rightarrow 0} x^2 - 5 = -5$$

Q43

Find the

$$\lim_{x \rightarrow 2} \frac{1}{|2-x|} \quad ?$$

$$2-x=0$$

$$x=2$$

$$\begin{array}{c} \text{+++} \quad \text{---} \\ \hline 2 \end{array}$$

$$\lim_{x \rightarrow 2} \frac{1}{x-2} = \boxed{+\infty}$$

Q44

$$\text{Let } f(x) = \begin{cases} \frac{x^2 - 9}{x+3} & x \neq -3 \\ K & x = -3 \end{cases}$$

Find K such that $\lim_{x \rightarrow -3} f(x)$ exist ??

بما أن النهاية موجودة فإن $f(-3) = \lim_{x \rightarrow -3} f(x)$ (*)

$$K = \lim_{x \rightarrow -3} \frac{(x-3)(x+3)}{(x+3)}$$

$$\boxed{K = -6}$$

Q45 The vertical asymptote of the graph of $f(x) = \frac{x^2 - x - 2}{x^2 + 4x + 3}$?

Solution $\Rightarrow$

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

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

$$\boxed{x=2}$$

$$\boxed{x=-1}$$

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

$$(x+1)(x+3) = 0$$

$$\boxed{x=-3}$$

$$\boxed{x=-1}$$

$$\lim_{x \rightarrow 2} \frac{(x-2)(x+1)}{(x+3)(x+1)} = \frac{0}{5} = 0$$

$$\lim_{x \rightarrow -1} \frac{(x-2)(x+1)}{(x+3)(x+1)} = \frac{-3}{2}$$

$$\lim_{x \rightarrow -3} \frac{(x-2)(x+1)}{(x+3)(x+1)} = \frac{-5}{0} = \boxed{-\infty}$$

$$\boxed{x=-3}$$

Q46

The vertical asymptote of

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

$$\begin{aligned} x^2 - 3x + 2 &= 0 \\ (x-2)(x-1) &= 0 \\ x &= 2 \\ x &= 1 \end{aligned} \quad \left\{ \begin{aligned} (x-1)^2 (x-2) &= 0 \\ x &= 2 \\ x &= 1 \end{aligned} \right.$$

$$\lim_{x \rightarrow 2} \frac{(x-2)(x-1)}{(x-1)(x-1)(x-2)} = 1$$

$$\lim_{x \rightarrow 1} \frac{(x-2)(x-1)}{(x-1)(x-1)(x-2)} = \frac{1}{0} = \infty$$

$x = 1$

محمد السفاريني

⊛ الحل من يدرس من هذه المدونة ⇐

هذه الأسئلة لسنوات وأسئلة كتاب وأسئلة غي مباشرة
متخصصة أفكار كثيرة ودراسها بفهم قادر
على أن يجعلك ~~أكثر~~ متمكن من المادة والحصول
على العلامة العالية .

سيفلتي

لجنة السيطري

السلة ممة
رمولة

محمّد المسخاري

Q1

Find

$$\frac{dy}{dx}$$

?

ص. ٢٧
م. ١٠١

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

راقبان
راقبان

$$\frac{(x^2 + 3) \cdot 2x - (x^2 - 3) 2x}{(x^2 + 3)^2}$$

$$\frac{2x^3 + 6x - (2x^3 - 6x)}{(x^2 + 3)^2}$$

$$= \frac{\cancel{2x^3} + 6x - \cancel{2x^3} + 6x}{(x^2 + 3)^2}$$

$$\frac{12x}{(x^2 + 3)^2}$$

ممكن يطلب

$$\frac{dy}{dx} \Big|_{x=1}$$

?

بعد ما اشتق

بحوض $x=1$

1

Q2

Find

$$\frac{dy}{dx}$$

or

$$f'(x) ?$$

ص.ج. اول

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

عدد
افغان

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

$$\boxed{\frac{-x}{(1+x^2)^{\frac{3}{2}}}}$$

Q3

Find

$$\frac{dy}{dt}$$

$$t=4$$

$$y = \sqrt[4]{t} ?$$

ص.ج. ۲

$$y = \sqrt[4]{t}$$

$$\frac{dy}{dt} = \frac{1}{4} t^{-\frac{3}{4}} = \frac{1}{4} * \frac{1}{t^{\frac{3}{4}}} \Big|_{t=4}$$

$$\frac{1}{4} * \frac{1}{\sqrt[4]{4^3}}$$

$$\frac{1}{4 \sqrt[4]{16 * 4}}$$

$$= \frac{1}{4} * \frac{1}{2 \sqrt[4]{4}} = \frac{1}{8 \sqrt[4]{4}} \checkmark$$

یعنی تست طبق القیاس

$$\frac{1}{8 \sqrt[4]{4}} = \boxed{\frac{1}{8 \sqrt{2}}}$$

Q

Q4 Let $f(x) = e^{\frac{x^2}{2}}$ then $f'(1)$? للسوات

$$f'(x) = e^{\frac{x^2}{2}} \cdot 2x \Big|_{x=1} = \boxed{2e}$$

Q5 Let $g(x) + \sin(xg(x)) = x^2 - 2$ للسوات

Note that $g(0) = -2$ $g'(0) = ?$

$$g'(x) + \cos(xg(x)) \cdot (xg'(x) + g(x)) = 2x$$

$$g'(0) + 1 \cdot (0 + g(0)) = 0$$

$$g'(0) + -2 = 0 \quad \boxed{g'(0) = 2}$$

Q6 If $f(2) = 2$ $f'(2) = 3$

Find $\frac{d}{dx} \left(\frac{f(x)}{x^2} \right)$?

$$\frac{x^2 f'(x) - 2x f(x)}{x^4} \Big|_{x=2}$$

$$\frac{4 \cdot 3 - 8}{16} = \boxed{\frac{1}{4}}$$

Q7 Find $\frac{dy}{dx}$?

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

$$f'(x) = \sec\left(\frac{1}{x}\right) \tan\left(\frac{1}{x}\right) * \frac{-1}{x^2}$$

Q8 Find $\frac{dy}{dx}$?

$$f(x) = \sin^3\left(\frac{\pi x}{2}\right)$$

$$f(x) = \left(\sin\left(\frac{\pi x}{2}\right)\right)^3 \rightarrow f'(x) = 3 \left(\sin\left(\frac{\pi x}{2}\right)\right)^2 * \left(\cos\left(\frac{\pi x}{2}\right)\right) \frac{\pi}{2}$$

$$= \boxed{\frac{3\pi}{2} \sin^2\left(\frac{\pi x}{2}\right) \cos\left(\frac{\pi x}{2}\right)}$$

Q9 IF $y = \sec(Kx)$ Show that

$$y'' = K^2 y (2y^2 - 1) ?$$

$$y' = K \sec(Kx) \tan(Kx)$$

$$y'' = K \sec(Kx) \cdot \sec^2(Kx) K + \tan(Kx) \cdot K \sec(Kx) K \tan(Kx)$$

$$K^2 \sec^3(Kx) + K^2 \sec(Kx) \tan^2(Kx)$$

$$~~K^2 \sec^3(Kx)~~ K^2 \sec(Kx) (\sec^2(Kx) + \tan^2(Kx))$$

من السؤال $\rightarrow$ $K^2 y (y^2 + \underline{y^2 - 1})$ متطابقة

$$K^2 y (2y^2 - 1) \quad \#$$

Q 10 IF $y = 2^x + \ln(\cosh(x))$

لستوائت

then $\frac{dy}{dx}$ at $x = 0$?

$$y' = 2^x \ln(2) + \frac{\sinh(x)}{\cosh(x)}$$

$$\ln 2 + \frac{e^0 - e^0}{e^0 + e^0}$$

$$= \boxed{\ln 2}$$

Q11 IF $\ln(y) + 2^x y = 8$

سواء

then $\frac{dy}{dx}$?

الاشتقاق الخفي

$$\frac{1}{y} y' + 2^x y' + y 2^x \ln 2 = 0$$

$$y' + 2^x y y' + 2^x y^2 \ln 2 = 0$$

$$y' (1 + 2^x y) = \frac{-2^x y^2 \ln 2}{2^x y + 1}$$

$$y' = \frac{-2^x y^2 \ln 2}{2^x y + 1}$$

Q12 IF $y = \cos^2\left(\frac{x}{2}\right)$ then $\frac{dy}{dx}$?

$$y = \left(\cos\left(\frac{x}{2}\right)\right)^2$$

$$y' = -2\left(\cos\left(\frac{x}{2}\right)\right) \cdot \sin\left(\frac{x}{2}\right) \cdot \frac{1}{2}$$

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

Q13

Find the values of

a, b, c

if

$f(x) =$

$$\begin{cases} ax^3 + bx^2 + cx & x \geq 1 \\ 3a + bx & x < 1 \end{cases}$$

and $c + 4a = 36$

$$\lim_{x \rightarrow 1^+} f(x) = \lim_{x \rightarrow 1^-} f(x)$$

$$a + b + c = 3a + b$$

$$\rightarrow a + c = 3a$$
$$\boxed{c = 2a} \rightarrow (1)$$

$$\int_1^+ f(x) = \int_{-1}^- f(x)$$

$$3a + 2b + c = b$$

$$\boxed{3a + c + b = 0} \rightarrow (2)$$

$$\boxed{c + 4a = 36} \rightarrow (3)$$

عوض معادلة (1) في معادلة (3)

$$6a = 36$$

$$\boxed{a = 6}$$

$$\boxed{c = 12}$$

$$18 + 12 = -b$$

$$\boxed{b = -30}$$

7

Q14 Find the equation of Normal tangent to the curve $y = \sqrt{x}$ at the point $(4, 2)$?

$$f(x) = y = \sqrt{x}$$

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

$$f'(4) = \frac{1}{4}$$

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

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

$$f(4) = 2$$

Q15 What the values of K is the line $x + y = K$ normal to

the curve $y = x^2$??

$$y = K - x$$

$$y'_1 * y'_2 = -1$$

$$-1 * 2x = -1$$

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

$$y = x^2 \quad \left\{ \begin{array}{l} K - x = x^2 \\ K = \frac{1}{4} + \frac{1}{2} \end{array} \right.$$

$$K = \frac{1}{4} + \frac{1}{2}$$

$$K = \frac{3}{4}$$

نقطة
المماسات

Q16

IS the equation of tangent

غيب

line at $x = a$ is

$$y - 1 = 2(x - 1) \text{ and}$$

$$\text{the } f(x) = x^2$$

Find the value of a ?

$$f'(x) = 2x$$

$$f'(a) = 2a$$

$$f(a) = a^2$$

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

$$-a^2 = -1$$

$$a = \pm 1$$

$$2a = 2$$

$$\boxed{a = 1}$$

تكررت نفس القيمة

Q17

Find

$$\frac{dx}{dy}$$

IF

غيب مباشر

$$\sqrt[3]{x} = z$$

$$\sqrt{\frac{z}{2}} = y$$

?

لا يوجد. افحصان به علاقة x, y عنك
نزل على نهاية المسلسلة

$$\frac{dx}{dy} = \frac{dx}{dz} * \frac{dz}{dy}$$

9

اجعل x, z موضوع القانون

$$x = z^3$$

$$\frac{dx}{dz} = 3z^2$$

$$z = 2y^2$$

$$\frac{dz}{dy} = 4y$$

$$\frac{dx}{dy} = 12 z^2 y$$

لأنه يكون به علاقة

$$12 * 4y^4 * y = \boxed{48y^5}$$

* سؤال مهم للمعني لم ألوح فليكنه في المسحح

لو طلب المشتقة 78 في 98 في عدد حسب الاجابة
نتبع هذه القاعدة

$$\left. \begin{aligned} f(x) &= \cos(x) \\ f'(x) &= -\sin(x) \\ f''(x) &= -\cos(x) \\ f'''(x) &= \sin(x) \\ f^{(4)}(x) &= \cos(x) \end{aligned} \right\}$$

بدلنا في $\cos(x)$
وعند المشتقة 4 رجعنا

للأصل

∴ لكل 4 مرات، اشتقاق يعود للإفتان
المذكور

وهذا الكلام يطبق على $\sin(x)$
 e^x

Q 18

For $x + 4y = xy$

مسئله

Find $\frac{d^2y}{dx^2} \Big|_{(8,2)}$?

Solution:-

$1 + 4y' = xy' + y$ ① مشتقة

$4y'' = xy'' + y' + y'$

$4y'' - xy'' = 2y'$

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

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

$4y' - xy' = y - 1$

$y'(4-x) = y - 1$

$y' = \frac{y-1}{4-x}$

تعويض

$y'' = \frac{2(y-1)}{(4-x)^2} \Big|_{(8,2)}$

$\frac{2}{16} = \boxed{\frac{1}{8}}$

11

Q 19 The slope of tangent line to the curve of $x^2y - x^2y + 2y = 0$ at the point $(2, 1)$ is ? سوال

$$x \cdot 2y' + y^2 - (x^2y' + y \cdot 2x) + 2y' = 0$$

$$4y' + 1 - (4y' + 4y) + 2y' = 0$$

$$4y' + 1 - 4y' - 4y + 2y' = 0$$

$$y' = \frac{4y - 1}{2}$$

$$\frac{4 - 1}{2} = \boxed{\frac{3}{2}}$$

Q 20 If $f(2) = 1$ and $g(x) = \ln(x^3 + 1)$

and $(g \circ f)'(2) = 6$ then find $f'(2)$?

Solution :-

$$g'(f(2)) * f'(2) = (g \circ f)'(2)$$

$\downarrow$ $\downarrow$ $\downarrow$
 سقوم با بکس ۰ $\downarrow$ $\downarrow$ $\downarrow$
 $\frac{3}{2}$ $\frac{3}{2}$ 6

$$g'(x) = \frac{3x^2}{x^3 + 1}$$

$$g'(1) = \frac{3}{2}$$

$$\frac{3}{2} * f'(2) = 6$$

$$\boxed{f'(2) = 4}$$

12

Q21 Let $f(x) = (x+1)^x$ then لستوا
 $f'(1)$?

لحم يقيم لثمة في المولسية
 عندما يكون المظلم، الشنفاق
 (إختان) إختان
 إلتبع الخطوات

$y = (x+1)^x$ ركب Ln للثمة

$\ln y = \ln (x+1)^x$

$\ln y = x \ln (x+1)$ الشنق اللثمة

$\frac{y'}{y} = \frac{x}{x+1} + \ln (x+1)$

$\frac{y'}{2} = \frac{1}{2} + \ln 2$

$y' = 1 + 2 \ln 2 = \boxed{1 + \ln 4}$

جد قيمة y
 عوضها في الإختان
 المذملي

$y = (1+1)^1 = 2^1 = 2$

[Q 22]

The value of c such that
Line $y = -x - 4$ is tangent مسوا
to the curve $y = c\sqrt{x}$?

$$y' = y' \equiv y = y \text{ متساوي}$$

$$y = y$$

$$\boxed{-x - 4 = c\sqrt{x}} \rightarrow (1)$$

$$y' = y'$$

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

$$\boxed{-2\sqrt{x} = c} \rightarrow (2)$$

$$-x - 4 = -2x$$

$$\boxed{x = 4}$$

$$-2\sqrt{4} = c$$

$$\boxed{c = -4}$$

Q23 Find the Limit?

$$\lim_{x \rightarrow -\infty} \frac{2x - 5}{|3x + 2|}$$

کتاب

$$\lim_{x \rightarrow -\infty} \frac{2x - 5}{-(3x + 2)} = \boxed{-\frac{2}{3}}$$

Q24 Find the Limit?

$$\lim_{x \rightarrow \infty} \frac{3x + 2\sqrt{x}}{1 - x}$$

لکھو
اقسام علی الجی
اس دے

$$\lim_{x \rightarrow \infty} \frac{-3x}{x} = \boxed{-3}$$

Q25 Find the Limit?

$$\lim_{x \rightarrow 2^+} \frac{x}{(2 - x)^3}$$

$2^+ \rightarrow$ 2 سے
 $2 < 2.0000001$

$$\lim_{x \rightarrow 2} \frac{2}{(2-x)^3} = \boxed{-\infty}$$

یوں ہی اسے
لیکھنا سبب

Q 26

Find the Limit ?

کتاب

$$\lim_{x \rightarrow \infty} \left(\sqrt{x^2 + 2x} - \sqrt{x^2 - 2x} \right)$$

معین بالوافق

$$\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 2x} - \sqrt{x^2 - 2x}}{1} \times \left(\frac{\sqrt{x^2 + 2x} + \sqrt{x^2 - 2x}}{\sqrt{x^2 + 2x} + \sqrt{x^2 - 2x}} \right)$$

$$\lim_{x \rightarrow \infty} \frac{x^2 + 2x - x^2 + 2x}{\sqrt{x^2 + 2x} + \sqrt{x^2 - 2x}}$$

$$= \lim_{x \rightarrow \infty} \frac{4x}{\sqrt{x^2 + 2x} + \sqrt{x^2 - 2x}}$$

$$\lim_{x \rightarrow \infty} \frac{4x}{2x} = \boxed{2}$$

Q 27

Find the Limit ?

$$\lim_{x \rightarrow \infty} \left(\frac{x^2}{x+1} - \frac{x^2}{x-1} \right)$$

در حد مقادیر

$$\lim_{x \rightarrow \infty} \frac{x^3 - x^2 - x^3 + x^2}{x^2 - 1}$$

$$= \lim_{x \rightarrow \infty} \frac{-2x^2}{x^2 - 1} = \boxed{-2}$$

16

Q28

Find the Limit ?

کتاب

$$\lim_{x \rightarrow 3} \frac{1}{(3-x)^2}$$

هون بقیض
المنفی ۱ > ۱
۳⁺ ۳⁻ لائن
فیه نی بیچ

$$= \boxed{\infty}$$

Q29

Find the Limit ?

کتاب

$$\lim_{x \rightarrow \infty} \frac{x^2 + \sin(x)}{x^2 + \cos(x)}$$

۱ تقسیم ۱
x²

$$\lim_{x \rightarrow \infty} \frac{1 + \frac{\sin(x)}{x^2}}{1 + \frac{\cos(x)}{x^2}}$$

$$= \boxed{1}$$

Note :- $\lim_{x \rightarrow \infty} \frac{\sin(x)}{x^2} = 0$

$$\lim_{x \rightarrow \infty} \frac{\cos(x)}{x^2} = 0$$

لے سیتے #
♡

11

Q30

Find

$$\lim_{h \rightarrow 0} \frac{6(1+h)^6 - 6}{h} \quad ?$$

تقسیم ۰ به ۰

$$f(x) = 6x^6$$

$$f'(x) = 36x \quad \Big|_{x=1} = \boxed{36}$$

Q31

Find $f^{(35)}(e^{2x})$?

$$f(x) = e^{2x}$$

$$f'(x) = 2e^{2x}$$

$$f''(x) = 2^2 e^{2x}$$

$$f'''(x) = 2^3 e^{2x}$$

⋮

$$f^{(35)}(x) = 2^{35} e^{2x}$$

e^{2x} دائماً بتكرار
المختلف هو 2

Q32

Find

$$\frac{d^{21}}{dx^{21}} (7^x)$$

?

$$f(x) = 7^x$$

$$f'(x) = \ln 7 \cdot 7^x$$

$$f''(x) = (\ln 7)^2 \cdot 7^x$$

نفس الشيء

سؤال 31

$$\boxed{f^{(21)}(x) = (\ln 7)^{21} \cdot 7^x}$$

Q33

Find

$$\frac{d^{28}}{dx^{28}} (\sin(x))$$

?

$$f(x) = \sin(x)$$

$$f'(x) = \cos(x)$$

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

$$f'''(x) = -\cos(x)$$

$$f^{(4)}(x) = \sin(x)$$

كل 4 مراتب سيعود إلى $\sin(x)$

$$\begin{array}{r} 4 \overline{) 29} \\ 28 \\ \hline 1 \end{array}$$

أي عند المشتقة 28

يكون $\sin(x)$

المطلوب المشتقة 29

$$\boxed{\cos(x)}$$

يكون

Q34

$$IS \quad f(x) = x^2 - 12x + 21$$

السؤال

$$x \leq 6 \quad \text{then} \quad (f^{-1})'(10) ?$$

$$(f^{-1})'(10) = \frac{1}{f'(f^{-1}(10))}$$

بالمعكوس

$$f(1) = 1 - 12 + 21 = 10 \checkmark$$

$$= \frac{1}{f'(1)}$$

$$f'(x) = 2x - 12$$
$$= -10$$

$$= \boxed{\frac{-1}{10}}$$

Q35

prove that

یہ ثابت کریں

$$\frac{d}{dx} (\sinh(x)) = \frac{4e^{2x} + 4}{8e^x} \quad ?$$

Solution $\Rightarrow$

$$f(x) = \sinh(x) = \frac{e^x - e^{-x}}{2}$$

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

$$= \frac{e^x + \frac{1}{e^x}}{2}$$

$$= \frac{e^{2x} + 1}{2e^x} \times \frac{4}{4}$$

$$\frac{4e^{2x} + 4}{8e^x}$$

##

اجنبية
لليغلي

كامل الجواب

محمد
المسحاري

Q1 Find ?

$$\int_0^1 \sin(3\pi t) dt$$

مباشر

Solution :-

$$\left. \frac{-\cos(3\pi t)}{3\pi} \right|_0^1$$

$$-\frac{\cos(3\pi)}{3\pi} - \left(-\frac{\cos(0)}{3\pi} \right) =$$

$$\frac{1}{3\pi} + \frac{1}{3\pi} = \boxed{\frac{2}{3\pi}}$$

1

Q2

Find ?

$$\int_0^1 (1-x)^9 dx$$

مباشراً

$$\left[\frac{-(1-x)^{10}}{10} \right]_0^1 =$$

$$-\frac{1}{10} (1-x)^{10} \Big|_0^1 =$$

$$-\frac{1}{10} ((0)^{10} - (1)^{10}) =$$

$$-\frac{1}{10} (-1) = \boxed{\frac{1}{10}}$$

2

Q3

$$\lim_{x \rightarrow \infty} \left(1 + \frac{5}{x}\right)^{2x}$$

حل

Find ?

$$\lim_{x \rightarrow \pm \infty} \left(1 + \frac{a}{x}\right)^{bx} = \frac{e^{ab}}{e^0} \quad \text{على القاعدة}$$

$$\begin{matrix} 10 \\ e \end{matrix}$$

Q4

If

$$\int_0^6 f(x) dx = 10$$

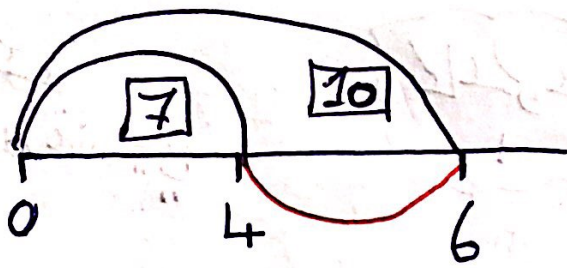
كتاب

$$\int_0^4 f(x) dx = 7$$

Find

$$\int_4^6 f(x) dx \quad ?$$

3



$$10 - 7 = \boxed{3}$$

Q5 Find ?

$$\int \left(\frac{1}{8-x} + \frac{1}{x+2} \right) dx$$

$$\int \frac{1}{8-x} dx + \int \frac{1}{x+2} dx$$

$$-\ln|8-x| + \ln|x+2|$$

$$\ln|x+2| - \ln|8-x|$$

$$\ln \left| \frac{x+2}{8-x} \right|$$

4

Q6

$\int \ln x$?

فدشة
كتاب

$$\int_1^2 \frac{\sqrt{e}}{1} * x^{-2} dx$$

Solution:-

$$\int_1^2 \frac{e^{\frac{1}{x}}}{x^2} dx$$

$$\begin{aligned} y &= \frac{1}{x} \\ \frac{dy}{dx} &= \frac{-1}{x^2} \\ dx &= -x^2 dy \end{aligned}$$

$$\int \frac{e^y}{x^2} \cdot (-x^2 dy) =$$

$$- \int e^y dy$$

$$- e^y$$

$$- e^{\frac{1}{x}} \Big|_1^2 = - e^{\frac{1}{2}} - (-e)$$

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

$$e - e^{\frac{1}{2}}$$

5

Q.7

IS

$$f(x) = \begin{cases} 2 & -2 \leq x \leq 0 \\ 4-x^2 & 0 \leq x \leq 2 \end{cases}$$

Find $\int_{-2}^2 f(x) dx$?

$$\int_{-2}^2 f(x) dx = \int_{-2}^0 2 dx + \int_0^2 (4-x^2) dx$$
$$= \left[2x \right]_{-2}^0 + \left[4x - \frac{x^3}{3} \right]_0^2$$

$$4 + 8 - \frac{8}{3}$$

$$4 + 8 - \frac{8}{3} = \boxed{\frac{28}{3}}$$

civilitee 

6

Q8

Find

-I

سوال

$$\int \frac{x^3 - 8}{2 - x} dx$$

$$\int \frac{\cancel{(x-2)}^{-1} (x^2 + 2x + 4)}{\cancel{(2-x)}} dx$$

$$= \int (x^2 + 2x + 4) dx$$

$$= \frac{x^3}{3} + x^2 + 4x + C$$

Q9

IF

سوال

$$\int (2x + g''(x)) dx = 5$$

$$g(0) = 1$$

Find $6g(x)$?

7

$$\int (2x) dx + \int g''(x) dx = 5$$

$$x^2 + g'(x) = 5$$

$$\int g'(x) dx = \int (5 - x^2) dx$$

$$g(x) = 5x - \frac{x^3}{3} + C$$

$$g(0) = C$$

$$\underline{C = 1}$$

$$g(x) = 5x - \frac{x^3}{3} + 1$$

$$\underline{\underline{6g(x) = 6\left(5x - \frac{x^3}{3} + 1\right)}}$$

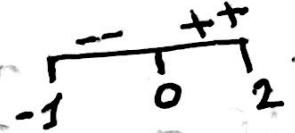
Q 10

Find ?

Q 10 *

$$\int_{-1}^2 (x - 2|x|) dx$$

$|x| = 0$



$$\int_{-1}^0 (x + 2x) dx + \int_0^2 (x - 2x) dx$$

$$\int_{-1}^0 (3x) dx + \int_0^2 (-x) dx$$

$$\left[\frac{3x^2}{2} \right]_{-1}^0 + \left[-\frac{x^2}{2} \right]_0^2$$

$$0 - \left(\frac{3}{2} \right) + -2$$

$$-\frac{3}{2} - 2 = \boxed{-3.5}$$

9

Q11

IF

$$\int_0^3 f(x) dx = 5$$

find = $\int_0^9 \frac{f(\sqrt{x})}{\sqrt{x}} dx$?

$$y = \sqrt{x}$$

$$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$$

$$dx = 2y dy$$

$$\int \frac{f(y)}{y} \cdot 2y dy$$

$$2 \int_0^3 f(y) dy$$

$$2 * 5 = 10$$

مکتبہ المسفار عربی

#civiltee

10

Q12 =

IF

$$\int_{-2}^2 (x^7 + K) dx = 16$$

Find the value of K?

$$\left[\frac{x^8}{8} + Kx \right]_{-2}^2 = 16$$

$$\frac{2^8}{8} + 2K - \left(\frac{(-2)^8}{8} - 2K \right) = 16$$

$$4 + K = 16$$

$$\boxed{K = 4}$$

الحل بالتفصيل هنا



Q13

IF

لأسوات المتكبر

$$\int f(x) \sin(x) dx = -f(x) \cos(x) + \int 6x \cos(x) dx$$

Find $f(x)$?

والاشتق الطرفي

$$\cancel{f(x) \sin(x)} = \cancel{f(x) \sin(x)} + -\cos(x) f'(x) + 6x \cos(x)$$

$$\cancel{6x \cos(x)} = \cancel{\cos(x)} f'(x)$$

$$f'(x) = 6x$$

$$f(x) = 3x^2$$

12

Q14

Find

$$\int (2x+1)(x+2)^7 dx \quad ?$$

$$y = x + 2$$

$$\frac{dy}{dx} = 1$$

$$dy = dx$$

$$\int (2(y-2)+1) y^7 dy$$

$$\int (2y-3) y^7 dy$$

$$\int (2y^8 - 3y^7) dy$$

$$\frac{2y^9}{9} - \frac{3y^8}{8}$$

$$\frac{2}{9} (x+2)^9 - \frac{3}{8} (x+2)^8 + C$$

13

Q15

Find $(f \circ g)'(x)$

من
عندي

IF $f(x) = 3x^2$

$C=0$

and $\int (g'(x) + 5) dx = 10x$?

$$\int g'(x) dx + \int 5 dx = 10x$$

$$\underline{\underline{g(x) = 5x}}$$

$$(f \circ g)'(x) = f'(g(x)) \cdot g'(x)$$

$$f'(x) = 6x$$

$$6(5x) \cdot 5$$

$$30x \cdot 5 =$$

$$\boxed{150x}$$

14

Q16

Find

$$\int_0^4 \cos^2(\theta) d\theta$$

? = I

حدود المتكامل واقتران

ما داخل المتكامل

$$h(\theta) = \cos^2 \theta$$

$$\frac{d}{dx} \cos^2(x^4) \cdot 4x^3 - \cos^2(\theta) \cdot 0$$

$$4x^3 \cos^2(x^4)$$

(*) هذا هو جوابي لا لازم يحي
عليه سؤال وقراءة

15



Q17

Find $h(t)$

نکشته مخ
من عندي

$$\frac{d}{dx} \int_0^{2x} h(t) dt = 4 \sqrt{\frac{1 + 16x^4}{4}} ?$$

$$h(2x) \cdot 2 - h(0) \cdot 0 = 2 \sqrt{1 + 16x^4}$$

$$h(2x) = \frac{\sqrt{1 + 16x^4}}{\sqrt{1 + (2x)^4}}$$

$$2x = t$$

$$h(t) = \sqrt{1 + t^4}$$

Civiltree

16

Q18

Find $g(x)$ IF:

للسنوات
المعروف

$$\frac{d}{dx} \int_1^{g(x)} \ln(t) \cdot dt = e^x \ln(e^x) \quad ?$$

$$\ln(g(x)) \cdot g'(x) - \ln(1) \cdot 0 = e^x \ln(e^x)$$

$$\ln(g(x)) \cdot g'(x) = e^x \ln(e^x)$$

$$g(x) = e^x$$

Q19

$$\text{IF } g(x) = \frac{2}{x} \int_2^{2x} \frac{t}{t+1} dt$$

$$\text{Find } g'(1) \quad ?$$

للسنوات

17

$$x^2 \cdot \left(\left(\frac{2x}{2x+1} \right) \cdot 2 - 0 \right) +$$

$$\int_2^{2x} \frac{t}{t+1} dt \cdot 2x = g'(x)$$

$$g'(1) = \text{zero}$$

$$2 \cdot \frac{2}{3} = \boxed{\frac{4}{3}}$$

سيفلتي

الحاجة لرسالة

و A في بيتل



Q20

Find the مباشر

Area enclosed by

the curves

$$f(x) = 12 - x^2$$

$$g(x) = x^2 - 6$$

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

$$12 - x^2 = x^2 - 6$$

$$18 = 2x^2$$

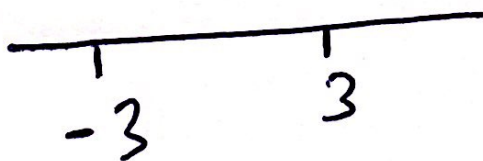
$$x^2 = 9$$

$$x = \pm 3$$

عوض 0 في

$f(x)$

$g(x)$



19

$$\int_{-3}^3 ((12 - x^2) - (x^2 - 6)) dx$$

$$\int_{-3}^3 (18 - 2x^2) dx$$

72

کتاب

[Q21] Find the values

للقطع
فقط

of c such that the

area of the region bounded

by the parabolas $\begin{matrix} c > 0 \\ c \neq 0 \end{matrix}$ اعتني

$$y_1 = x^2 - c^2$$

is 576 ?

$$y_2 = c^2 - x^2$$

20

$$\frac{x^2}{2} - c^2 = c^2 - x^2$$

$$2x^2 = 2c^2$$

$$x^2 = c^2 \quad x = \pm c$$

$$\int_{-c}^c (x^2 - c^2 - c^2 + x^2) dx$$

$$\int_{-c}^c (2x^2 - 2c^2) dx$$

$$\frac{2x^3}{3} - 2c^2x \Big|_{-c}^c$$

$$c = 6$$

Q23

Find ?

مسئله

$$\int_0^{\ln(\sqrt{3})} \frac{2e^{-x}}{1+e^{-2x}} dx$$

$$-2 \int_0^{\ln \sqrt{3}} \frac{-e^{-x}}{1+(e^{-x})^2} dx$$

$$-2 \tan^{-1}(e^{-x}) \Big|_0^{\ln \sqrt{3}}$$

$$-2 \tan^{-1} e^{-\ln(\sqrt{3})} - \left(-2 \tan^{-1}(1) \right) =$$

$$-2 \tan^{-1}\left(\frac{1}{\sqrt{3}}\right) + 2 \tan^{-1}(1)$$

$$-2 \frac{\pi}{6} + 2 \frac{\pi}{4} = \boxed{\frac{\pi}{6}}$$

23

Q24

Find ? لستوات

$$\int \sinh(6 - 2x) dx$$

$$-\frac{1}{2} \cosh(6 - 2x) + C$$

Q25

Find ?

لستوات
المأزغنية

$$\int \frac{(\ln(x))^2}{x} dx$$

$$\begin{aligned} y &= \ln(x) \\ \frac{dy}{dx} &= \frac{1}{x} \\ dx &= x dy \end{aligned}$$

$$\int \frac{y^2}{x} \cdot x dy$$

$$\frac{y^3}{3} + C$$

$$\frac{(\ln x)^3}{3} + C$$

24

25

Q26

Find ?

جواب

$$\int (x^2 + 1) (x^3 + 3x)^4 dx$$

$$y = x^3 + 3x$$

$$\frac{dy}{dx} = 3x^2 + 3$$

$$\frac{dy}{3(x^2 + 1)} = dx$$

$$\int (x^2 + 1) \cdot y^4 \cdot \frac{dy}{3(x^2 + 1)}$$

$$\frac{1}{3} \int y^4 dy$$

$$\frac{y^5}{15} + C$$

$$\frac{(x^3 + 3x)^5}{15} + C$$

25