

MATH 302 QUIZ 4

1) Find the derivative of the function.

$$h(s) = -2$$

$$\sqrt{7s^2 + 5}$$

$$h(s) = \sqrt{7(-2)^2 + 5}$$

$$= \sqrt{7(-2)^2 + 5}$$

$$\sqrt{7(4) + 5}$$

$$\sqrt{28 + 5}$$

$$\underline{\underline{\quad\quad\quad}}$$

2 find the derivative of the function

$$y = \frac{4x}{\sqrt{x^2+8}}$$

$$y(x) = 4x \cdot (x^2+8)^{-1/2}$$

$$f'(x) = (1)(x^2+8)^{-1/2} + 4x \cdot (-1/2)(x^2+8)^{-3/2} \cdot 2x$$

$$= (x^2+8)^{-3/2} (x^2+8) - 4x^2 (x^2+8)^{-3/2}$$

$$= (x^2+8)^{-3/2} (x^2+8 - 4x^2)$$

$$= \frac{3x^2+8}{(x^2+8)^{4/3}}$$

$$= \frac{3x^2+8}{(x^2+8)^{4/3}}$$

③ find the derivative of the trigonometric function.

$$g(x) = 6 \tan(4x)$$

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$$\therefore \tan(u') = \sec^2 u$$

$$\therefore u = 4x$$

$$u' = 4$$

$$\frac{dy}{dx} = 6(4 \sec^2(4x))$$

$$g(x) = \underline{\underline{24 \sec^2(4x)}}$$

$$\frac{dy}{dx} = 4x^2$$

④ find dy/dx by implicit differentiation.

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

$$\frac{dy}{dx} = \frac{d}{dx} 4x^2y + \frac{d}{dx} 6y^2x = \frac{d}{dx} (-3)$$

$$= 8x + 4x^2(1) \frac{dy}{dx} + 12y^2 + 6y^2(1) = 0$$

$$= 8x + 4x^2 + 12xy + 6y^2$$

$$= \underline{\underline{20xy + 4x^2 + 6y^2}}$$

.....
Your Ref:

5) find $\frac{dy}{dx}$ by implicit differentiation. Then find the slope of the graph at the given point
 $xy = 7, (-7, -1)$

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

$$2x + 2y = 7$$

$$2(x+y) = 7$$

$$2(x+y) = \frac{7}{2}$$

$$x+y = 3\frac{1}{2}$$

$\therefore \Delta H:$

b) find an equation of the tangent line to the graph at the given point.

$$\sqrt{x} + \sqrt{y} = 3, (4, 1)$$

$$x + y = 3^2$$

$$x + y = 9$$

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

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

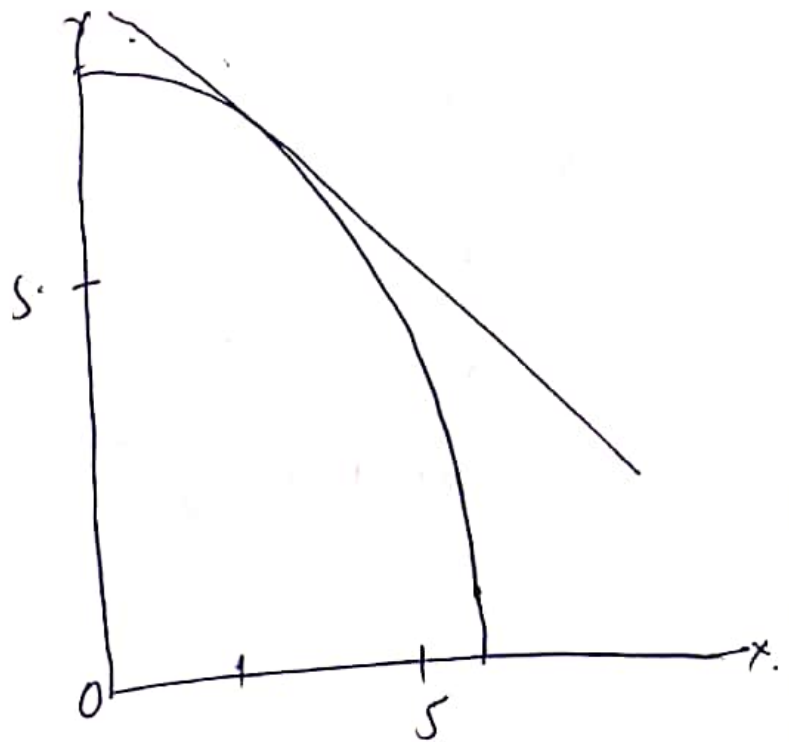
$$qx - 36 = y - 1$$

$$qx - 36 + 1 = y$$

$$qx - 35 = y$$

$$\underline{\underline{y = 9x - 35}}$$

x	0	1	2	3
y	-35	-26	-17	-8



Our Ref:

Your Ref:

⑧ A point is moving along the graph of the given function at the rate dx/dt

find $\frac{dy}{dx}$.

for the given values of x

$$y = 2x^2 + 3$$

$$\frac{dx}{dt} = 2 \text{ cm/s}$$

(a) $x = -1$, (b) 0 (c) $x = 1$

$$\frac{dx}{dt} = 2$$

$$\frac{dy}{dt} = 4x \cdot \frac{dx}{dt}$$

$$(a) \quad 2(-1)(2) = -8 \text{ cm/sec}$$

$$(b) \quad 2(0)(2) = 0 \text{ cm/sec}$$

$$(c) \quad 2(1)(2) = 8 \text{ cm/sec}$$

8) Find the radius r of a circle is increasing at a rate of 7 centimeters per minute. Find rate of change of the area when $r = 33$ centimeters.

$$A = \pi R^2$$

$$R = 33$$

$$\frac{dR}{dt} = +7 \text{ cm/min.}$$

$$\frac{dA}{dt} = \pi R^2 \frac{d}{dt}$$

$$= \pi (7)^2 \frac{d}{dt}$$

$$= \pi (21) \frac{dr}{dt}$$

$$= 2\pi (33) \left(\frac{7 \text{ cm}}{\text{min}} \right)$$

$$= \underline{\underline{442 \text{ cm}^2/\text{min.}}}$$

$$\frac{66}{2} = 442$$

9) $\frac{1}{3} \pi r^2 h$ 4 ft/min. 22 feet high

$$3 h' = \frac{1}{3} \pi r^2 h$$

$$d = 2R$$

$$d = 3h$$

$$2R = 3h$$

$$\frac{dV}{dt} = 4$$

$$h = 22$$

$$V = \frac{1}{3} \pi r^2 h$$

$$V = \frac{1}{3} \pi \left(\frac{3}{2} h \right)^2 h$$

$$\frac{d}{dt} \left\{ V = \frac{1}{3} \pi \left(\frac{3}{2} h \right)^2 h \right\}$$

$$\frac{dV}{dt} = \frac{9}{2} \pi (3h^2) \frac{dh}{dt}$$

$$4 = \frac{9}{2} \pi (3) (22) \frac{dh}{dt}$$

$$4 = 27\pi$$

$$\frac{dh}{dt} = \frac{4}{27} \text{ ft/min.}$$

10) consider the following function point

$$\left(\frac{\sqrt{2}}{4}\pi, \frac{\sqrt{2}}{4}\right) = (0.32, \frac{\sqrt{2}}{2})$$

$$y = \cos(3x)$$

① Derivative.

$$y' = -\sin(3x) \cdot 3$$

$$y' = -3\sin\left(\frac{3\sqrt{2}}{4}\pi\right), -3\frac{\sqrt{2}}{2} = \text{slope} = m$$

$$\therefore y - \left(-\frac{\sqrt{2}}{2}\right) = \frac{-3\sqrt{2}}{2} \left(x - \frac{\sqrt{2}}{4}\right)$$

$$y = -\frac{3\sqrt{2}}{2}x + \frac{3\sqrt{2}}{8}\sqrt{2} - \frac{\sqrt{2}}{2}$$

$$y = -\frac{3\sqrt{2}}{2}x + \frac{(3\sqrt{2}\pi - 4\sqrt{2})}{8}$$

$$y = -\frac{3}{2}\sqrt{2}x + \frac{\sqrt{2}}{8}(3\pi - 4)$$

10

b)

