

$y' = 3x^2$
 $y' = 3$ 75

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$y - 1 = 3(x + 1)$
 $y = 3x + 3 + 1$
 $y = 3x + 4$

I. Circle the right answer. (5 point each)

1) Find the slope for $f(x) = -5x^2$ at $x = 3$

$f(x) = -10x$ $f(x) = -10(3)$

- A) 30 B) -75 C) -45 D) -30

2) What is the equation of the tangent line for the curve $y = x^2 + 2$ at the point $(-1, 1)$ $y - y_1 = m(x - x_1)$

- A) $y = -3x + 4$ B) $y = 3x - 4$ C) $y = 3x + 4$ D) $y = -3x - 4$

$y = 3x^2$ $y = (-3) + \frac{3h - 12}{h}$

3) The following functions is not differentiable at $x = -4$

$y - 1 = -8(x + 1)$
 $y - 1 = -8x - 8$

$y = -3(x + h) + 4 + 3x - 4$
 $y = -3h - 8$

- a) $f(x) = |x + 4|$ b) $f(x) = x^2 - 4$ c) $f(x) = \frac{x + 2}{x - 4}$ $f(x) = \sqrt{-x + 4}$

4) The following function is not differentiable at $x = 1$

- a) $f(x) = \frac{1}{x + 1}$ b) $y = (x - 1)^2$ c) $f(x) = |x + 1|$

$-4 + 2 = -\frac{2}{1}$
 d) $f(x) = \sqrt[3]{x - 1}$

II. Answer the following questions.

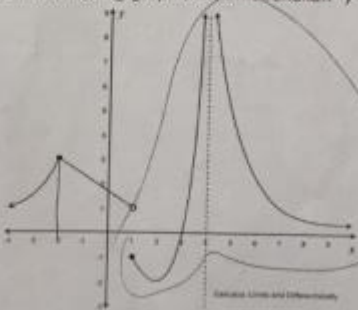
1. The position of an object, s , at any time, t , is given by: (15 points)

$s(t) = -18t^3 + 15t + 8$ where s is measured in feet and t is measured in seconds.

Find the equation of acceleration at any time $a(t)$.

$a(t) = -54t^2 + 15$
 $a(t) = v'(t)$

2. The following graph shows the function $y = f(x)$ (20 points)



$(x+h)(x+h)(x+h)$
 $(x+h)(x^2 + 2xh + h^2)$
 $y = x^3 + 2$

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

$x^3 + 2x^2h + xh^2 + xh^2 + 2xh^2 + h^3$
 $x^3 + 2xh^2$

- a) Find the values of "x" where the function is not continuous 1, 3, 5, 7, 9
 b) Find the values of "x" where the function is not differentiable -2, 1, 3

$$(x+h)(x+h)$$

$$x^2 + xh + xh + h^2$$

III. Find the derivative by definition of the following function: (15 points)

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

$$f'(x) = \frac{3(x+h)^2 + 5 - (3x^2 + 5)}{h} = f'(x) = \frac{3x^2 + 6xh + 3h^2 + 5 - 3x^2 - 5}{h}$$

$$f'(x) = \frac{6xh + 3h^2}{h} = f'(x) = \frac{3h(2x + h)}{h} = f'(x) = 3(2x + h)$$

$$f'(x) = 6x + 3h$$

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

IV. Find the derivative of the following:

a) $f(x) = 8\sqrt{x^3} - 2x^3 + \frac{5}{x^2}$ (10 points)

$$(x^3)^{1/4}$$

$$f'(x) = 8x^{3/4} - 2x^3 + 5x^{-2}$$

$$f'(x) = 6x^{-1/4} - 6x^2 - 10x^{-3}$$

$$f'(x) = \frac{6}{\sqrt[4]{x}} - 6x^2 - \frac{10}{x^3}$$

b) $f(x) = 2(1-3x^2)^5 + \sqrt{4x-1}$ (10 points)

$$f'(x) = 10(1-3x^2)^4 (-6x) + \frac{1}{2\sqrt{4x-1}}$$

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Simplify

c) $f(x) = 7(4x-5x^3)^6$ (10 points)

$$f'(x) = 42(4x-5x^3)^5 (4-15x^2)$$