

Calculus AB Chapter 2.2-2.3 Morning Quiz Review

1. A particle moves along the x -axis so that at time $t \geq 0$, its position is given by $x(t) = t^3 - 3t^2 - 9t + 2$.

- (a) At $t = 0$, is the particle moving to the right or to the left? Justify.
- (b) At what time(s) does the particle change directions. Justify.
- c) Find all values of t for which the particle is moving to the left. Justify
- d) Find all values of t for which the particle is moving to the right. Justify

2. ^(a) Determine the x -coordinates at which the graph of the function has a horizontal tangent line. ^(b) Find tangent line equation(s)

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

3) If $y = \frac{2-x}{3x+1}$, then $\frac{dy}{dx} =$

- (A) $-\frac{7}{(3x+1)^2}$ (B) $\frac{6x-5}{(3x+1)^2}$ (C) $-\frac{9}{(3x+1)^2}$ (D) $\frac{7}{(3x+1)^2}$ (E) $\frac{7-6x}{(3x+1)^2}$

4. Find the equation of the tangent line to $y = \frac{2-x}{5+x}$ at $x = 1$.

5. Given $f(x) = \frac{4x^3}{\sqrt{x}} - 3x(\sqrt[5]{x}) - 6x^3(2\sqrt{x} - 4x) - 4\pi x + 3.99$ Find $f'(x)$

$$v(t) = 3t^2 - 6t - 9$$

$$a(t) = 6t - 6$$

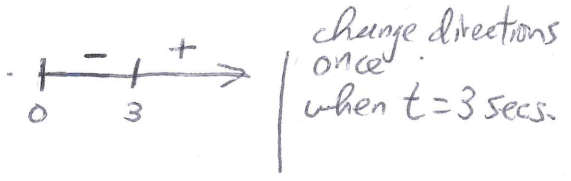
A particle moves along the x-axis so that at time $t \geq 0$, its position is given by $x(t) = t^3 - 3t^2 - 9t + 2$.

(a) At $t=0$, is the particle moving to the right or to the left? Justify.

$v(0) = -9$ Since $v(0) < 0$, particle moves to the left

(b) At what time(s) does the particle change directions. Justify.

*set $v(t) = 0$ | $0 = 3(t^2 - 2t - 3)$ | $t = 1, 3$ secs.
 $0 = 3t^2 - 6t - 9$ | $= 3(t-3)(t+1)$ | $t = -1, t = 3$



change directions once when $t = 3$ secs.

(c) Find all values of t for which the particle is moving to the left. Justify

$v(t) < 0$ in the interval $[0, 3)$

(d) Find all values of t for which the particle is moving to the right. Justify

$v(t) > 0$ in interval $(3, \infty)$

2. Determine the x-coordinates at which the graph of the function has a horizontal tangent line.

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

Use Quotient Rule $\frac{f'g - fg'}{g^2} = \frac{2x^2 - 2x - x^2}{(x-1)^2}$

$0 = x(x-2)$
 $x = 0, x = 2$

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

set numerator of $f'(x) = 0$
 Tangent line equations:
 $y = 0$ and $y = 4$

3) If $y = \frac{2-x}{3x+1}$, then $\frac{dy}{dx} =$

(A) $-\frac{7}{(3x+1)^2}$

(B) $\frac{6x-5}{(3x+1)^2}$

(C) $-\frac{9}{(3x+1)^2}$

(D) $\frac{7}{(3x+1)^2}$

(E) $\frac{7-6x}{(3x+1)^2}$

$y' = \frac{(-1)(3x+1) - (2-x)(3)}{(3x+1)^2} = \frac{-3x-1-6+3x}{(3x+1)^2} = \frac{-7}{(3x+1)^2}$

4. Find the equation of the tangent line to $y = \frac{2-x}{5+x}$ at $x = 1$.

$y' = \frac{-1(5+x) - (2-x)(1)}{(5+x)^2} = \frac{-5-x-2+x}{(5+x)^2}$ | $y(1) = \frac{2-1}{5+1} = \frac{1}{6}$

$y'(1) = \frac{-7}{6^2} = \frac{-7}{36}$

point: $(1, \frac{1}{6})$
 slope: $m = \frac{-7}{36}$

$y - \frac{1}{6} = \frac{-7}{36}(x-1)$

5. Given $f(x) = \frac{4x^3}{\sqrt{x}} - 3x\sqrt[5]{x} - 6x^3(2\sqrt{x} - 4x) - 4\pi x + 3.99$ Find $f'(x)$

$f(x) = 4x^{5/2} - 3x^{6/5} - 12x^{7/2} + 24x^4 - 4\pi x + 3.99$

$f'(x) = \frac{5}{2} \cdot 4x^{3/2} - \frac{6}{5} \cdot 3x^{1/5} - \frac{7}{2} \cdot 12x^{5/2} + 4 \cdot 24x^3 - 4\pi + 0$

$f'(x) = 10x^{3/2} - \frac{18}{5}x^{1/5} - 42x^{5/2} + 96x^3 - 4\pi$