2.2- 2.3 Quiz Review

1. The velocity of a function is described by the function $v(t) = \frac{1}{3}t^3 - 2t^2 + 3t + 2$.

   a) Find the time(s) when acceleration is zero

   b) Find the velocity when acceleration is zero

2. The position function of a particle moving in a straight line is $x(t) = t^3 - 9t^2 + 24t - 2$ meters for $t > 0$ seconds.

   a. When is the particle at rest?

   b. During what time interval is particle moving to the right?

   c. During what time interval is the particle moving to the left?

3. Given function $f(x) = \frac{x}{x-3}$

a. Find the equation of tangent line to the curve at $x = 4$

b. Find the equation of the tangent line to the curve where the slope is equal to $-\frac{3}{4}$

4. Given $f(x) = \sqrt[3]{x}\,(1 - x^3)$. Find $f'(x)$

5. Given $f(x) = \frac{2}{\sqrt{x}} - 5\sqrt[4]{x} + 12x^3 - 4\pi + 6.5x$ Find $f'(x)$

KEY

2.2- 2.3 Quiz Review

1. The velocity of a function is described by the function $v(t) = \frac{1}{3}t^3 - 2t^2 + 3t + 2$.

a) Find the time(s) when acceleration is zero

$a(t) = t^2 - 4t + 3$

$0 = (t-3)(t-1)$

$t = 1, 3$

$\boxed{t = 1, 3}$

b) Find the velocity when acceleration is zero

$v(3) = \frac{1}{3}(3)^3 - 2(3)^2 + 3(3) + 2 =$

$= 9 - 18 + 9 + 2 = \boxed{2}$

$v(1) = \frac{1}{3} - 2 + 3 + 2 = \boxed{\frac{10}{3}}$

2. The position function of a particle moving in a straight line is $x(t) = t^3 - 9t^2 + 24t - 2$ meters for $t > 0$ seconds.

a. When is the particle at rest?

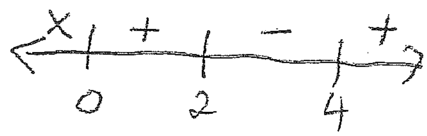
$v(t) = 3t^2 - 18t + 24$

$v(t) = 3(t^2 - 6t + 8)$

$v(t) = 3(t-4)(t-2)$

$0 = 3(t-4)(t-2)$

$\boxed{t = 2, 4 \text{ secs.}}$



b. During what time interval is particle moving to the right?

$(0, 2) \cup (4, \infty)$

c. During what time interval is the particle moving to the left?

$(2, 4)$

3. Given function $f(x) = \frac{x}{x-3}$

$f(4) = \frac{4}{4-3} = 4$ point $(4, 4)$

slope: $m = -3$

$\boxed{y - 4 = -3(x - 4)}$

a. Find the equation of tangent line to the curve at $x = 4$

$f'(x) = \frac{1(x-3) - x(1)}{(x-3)^2}$

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

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

$f'(4) = \frac{-3}{(4-3)^2} = \frac{-3}{1} = -3$

b. Find the equation of the tangent line to the curve where the slope is equal to $-\frac{3}{4}$

$\frac{-3}{4} = \frac{-3}{(x-3)^2}$

$-3(x-3)^2 = -3(4)$

$(x-3)^2 = 4$

$x^2 - 6x + 9 = 4$

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

$(x-5)(x-1) = 0$

$x = 1, 5$

$f(1) = \frac{1}{1-3} = \frac{-1}{2}$

$f(5) = \frac{5}{5-3} = \frac{5}{2}$

$\boxed{y + \frac{1}{2} = -\frac{3}{4}(x-1) \qquad y - \frac{5}{2} = -\frac{3}{4}(x-5)}$

4. Given $f(x) = \sqrt[3]{x}\,(1 - x^3)$. Find $f'(x)$

$f(x) = x^{1/3}(1 - x^3)$

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

$= \frac{1 - x^3}{3x^{2/3}} - 3x^{7/3}$

$\boxed{f'(x) = \frac{1 - x^3}{3\sqrt[3]{x^2}} - 3\sqrt[3]{x^7}}$

5. Given $f(x) = \frac{2}{\sqrt{x}} - 5\sqrt[4]{x} + 12x^3 - 4\pi + 6.5x$ Find $f'(x)$

$f(x) = 2x^{-1/2} - 5x^{1/4} + 12x^3 - 4\pi + 6.5x$

$f'(x) = 2(-\frac{1}{2})x^{-3/2} - 5(\frac{1}{4})x^{-3/4} + 36x^2 + 0 + 6.5$

$= \frac{-1}{x^{3/2}} - \frac{5}{4x^{3/4}} + 36x^2 + 6.5$

$= \boxed{\frac{-1}{\sqrt{x^3}} - \frac{5}{4\sqrt[4]{x^3}} + 36x^2 + 6.5}$