Practice Quiz 4 solutions

1) $f(x) = 2x^{-\frac{1}{2}} - 7x^{-1} + 3x^3 - 7x + 5$

$f'(x) = 2\left(-\frac{1}{2}\right)x^{-\frac{3}{2}} + 7x^{-2} + 9x^2 - 7$

2) $f(x) = 3x^{\frac{3}{5}} - 4x^{-3} + 5x^{-\frac{1}{4}}$

$f'(x) = 3\left(\frac{3}{5}\right)x^{-\frac{2}{5}} + 12x^{-4} + 5\left(-\frac{1}{4}\right)x^{-\frac{5}{4}}$

3) $f(x) = \frac{6}{5}x^{\frac{3}{4}} - \frac{x^2}{x^2} + \frac{4}{x^2} - 16x^{\frac{5}{6}}$

$f(x) = \frac{6}{5}x^{\frac{3}{4}} - 1 + 4x^{-2} - 16x^{\frac{5}{6}}$

$f'(x) = \left(\frac{6}{5}\right)\left(\frac{3}{4}\right)x^{-\frac{1}{4}} - 8x^{-3} - 16\left(\frac{5}{6}\right)x^{-\frac{1}{6}}$

4) $f(x) = \frac{9x^2}{x^{\frac{1}{2}}} + \frac{6}{5}x^{-\frac{2}{5}} - \frac{1}{3}x^{\frac{3}{7}}$

$f(x) = 9x^{\frac{3}{2}} + \frac{6}{5}x^{-\frac{2}{5}} - \frac{1}{3}x^{\frac{3}{7}}$

$f'(x) = 9\left(\frac{3}{2}\right)x^{\frac{1}{2}} + \frac{6}{5}\left(-\frac{2}{5}\right)x^{-\frac{7}{5}} - \frac{1}{3}\left(\frac{3}{7}\right)x^{-\frac{4}{7}}$

5) $f(x) = 4x^6 - 3x^4 + 2x^3 - 14x^2$

$f'(x) = 24x^5 - 12x^3 + 6x^2 - 28x$

6) $f(x) = \frac{2x^3}{9} - \frac{4x^2}{5} + \frac{6x}{7} + 10 - 10x^{-2}$

$f'(x) = \frac{6x^2}{9} - \frac{8x}{5} + \frac{6}{7} + 20x^{-3}$

7) $y = \frac{2x^3}{3} + \frac{9x^2}{2} - 5x + \frac{8}{3}$

$\frac{dy}{dx} = 2x^2 + 9x - 5$

$2x^2 + 9x - 5 = 0$
$(2x-1)(x+5) = 0$
$x = \frac{1}{2}, \quad x = -5$

-10	-5	0	$\frac{1}{2}$	1
$+$		$-$		$+$

$\frac{dy}{dx} = (2x-1)(x+5)$

the graph of y has a rel. max @ $x = -5$ b/c y' changes from (+) to neg and it has a rel. min @ $x = \frac{1}{2}$ b/c y' changes from neg to pos.

8) $y = \frac{x^4}{4} + \frac{x^3}{3} - 2x^2 - 4x + 16$

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

$y' = (x^2-4)(x+1)$

$(x^3 + x^2)(-4x - 4) = 0$
$x^2(x+1) - 4(x+1) = 0$
$(x+1)(x^2-4) = 0$
$x+1 = 0 \qquad x^2 - 4 = 0$
$x = -1 \qquad x = \pm 2$

-5	-2	$-1\frac{1}{2}$	-1	0	2	5
$-$		$+$		$-$		$+$

the graph of y has a rel. max @ $x = -1$ b/c y' changes from (+) to neg. and has a rel. min @ $x = -2, 2$ b/c y' changes from neg to pos.