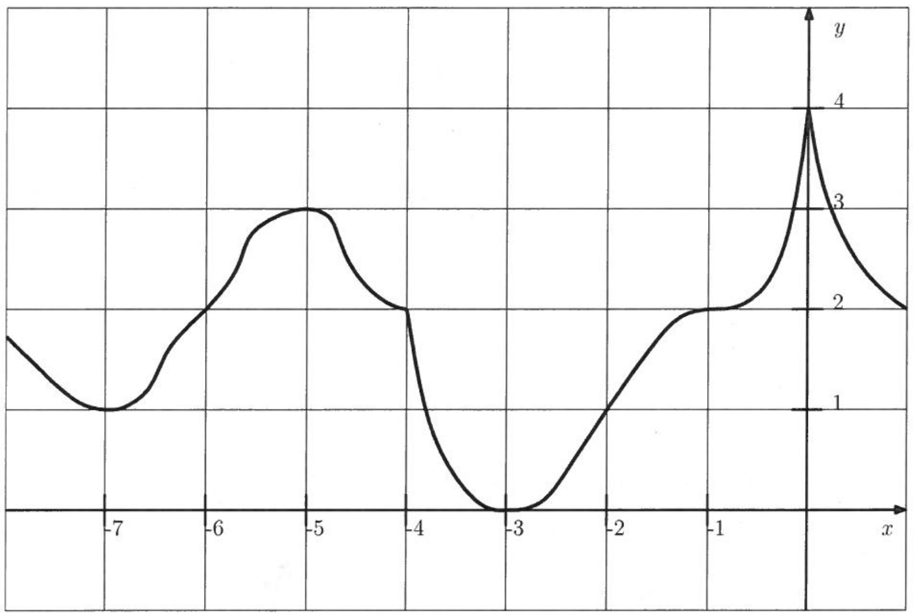
**Math 1210: Quiz #6** **Fall 2017**

| Name: SOLUTION | A#: | Section: |
|---|---|---|

[8] 1. Let $f$ be a function whose graph of $y = f(x)$ is given below.




Fill in the following.

(a) The critical ~~values of~~ points for $f$ are: $-7, -5, -4, -3, -1, 0$

(b) $f$ has local minima at: $-7, -3$

(c) $f$ has local maxima at: $-5, 0$

(d) On the following intervals we have $f'(x) > 0$: $(-7,-5), (-3,-1), (-1,0)$

(e) The global maximum of $f$ on $(-8, 1)$ is $4$

(f) The global minimum of $f$ on $(-8, 1)$ is $0$

(g) The global maximum of $f$ on $[-7, -6]$ is $2$

(h) The global minimum of $f$ on $[-2, 0]$ is $1$

v6.AB

[3] 2. List and classify critical points of $f$, if its **derivative** is given by

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

$$\begin{array}{c|ccccccc} f' & + & | & - & | & - & | & + \\ \hline & & -2 & & 0 & & 2 & \end{array}$$

Critical points : $-2$ (local max.), $0$ (not a local extremum), $2$ (loc. min)

[4] 3. Let $x, y$ be functions of $t$ related by $4x^2y^2 = x^4 + y^4$. Compute $\frac{dy}{dt}$ in terms of $x, y, \frac{dx}{dt}$.

$$8xy^2\frac{dx}{dt} + 8x^2y\frac{dy}{dt} = 4x^3\frac{dx}{dt} + 4y^3\frac{dy}{dt}$$

$$\frac{dy}{dt}(8x^2y - 4y^3) = \frac{dx}{dt}(4x^3 - 8xy^2)$$

$$\frac{dy}{dt} = \boxed{\frac{dx}{dt} \cdot \frac{4x^3 - 8xy^2}{8x^2y - 4y^3}} = \frac{dx}{dt}\,\frac{x^3 - 2xy^2}{2x^2y - y^3}$$

[5] 4. Find the global (absolute) maximum and the global minimum of $f(x) = x^3 + 6x^2$ on $[-5, -1]$.

$$f'(x) = 3x^2 + 12x = 3x(x+4).$$

Critical points : $-4$, $0$ ← not in the interval

| $x$ | $f(x)$ | |
|---|---|---|
| $-5$ | $25$ | |
| $-4$ | $32$ | max |
| $-1$ | $5$ | min |

$f(-5) = (-5)^3 + 6(-5)^2 = -125 + 150 = 25$

$f(-2) = (-4)^3 + 6(-4)^2 = -64 + 96 = 32$

$f(-1) = (-1)^3 + 6(-1)^2 = 5.$

v6.AB