Math 234 BD4 Quiz 6 (3.1, 3.2) **Name (Last,First)**: Solutions

You must show all your work to receive credit.

1a.] (3 pts) Find all the "critical numbers" of $f(x) = x^3 + \frac{3}{2}x^2 - 36x + 10$.

$$f'(x) = 3x^2 + \frac{3}{2}(2)x - 36$$
$$= 3x^2 + 3x - 36.$$

f' is never undefined.

f' is zero when $3x^2+3x-36=0$

$$3(x^2+x-12)=0$$
$$3(x+4)(x-3)=0$$

$3=0$ or $x+4=0$ or $x-3=0$

$\times$ $\quad \underline{x=-4} \quad \underline{x=3}$

1b.] (2 pts) Find all the "possible inflection points" of $f(x)$.

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

f'' is never undefined.

f'' is zero when $6x+3=0$

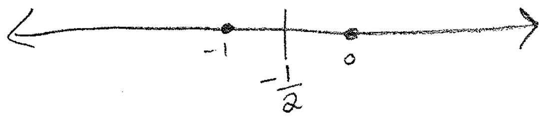
$$3(2x+1)=0$$

$3=0$ or $2x+1=0$

$\times$ $\quad 2x=-1$

$\underline{x=-1/2}$

 1c.] (3pts) Determine all intervals on which $f(x)$ is concave up and concave down.

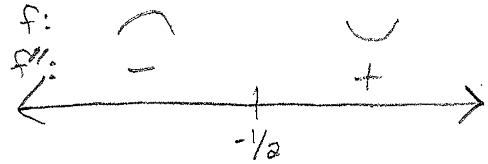


$f''(-1) = 6(-1)+3 = -6+3 = -3 < 0$

So $f(x)$ is concave down on the interval $(-\infty, -\frac{1}{2})$.

$f''(0) = 6(0)+3 = 0+3 = 3 > 0$

So $f(x)$ is concave up on the interval $(-\frac{1}{2}, \infty)$.



1d.] (2pts) Classify each critical number found in part 1a as a relative maximum, relative minimum, or neither.

Using the second derivative test:

$f''(-4) = 6(-4)+3 = -24+3 = -21 < 0$

So $f(x)$ has a relative maximum at $x = -4$.

$f''(3) = 6(3)+3 = 18+3 = 21 > 0$

So $f(x)$ has a relative minimum at $x = 3$.