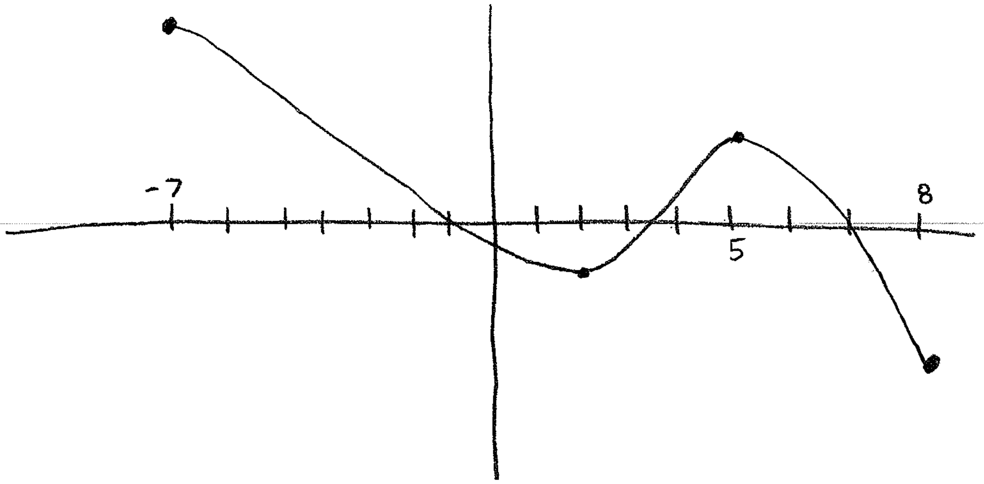
Quiz Review
3.1-3.4

Name Key 11/15/2011

1. Draw the graph of a function that meets the following conditions:

a. domain [-7, 8]
b. $f'(2) = 0$
c. $f'(x) < 0$ for $-7 < x < 2$
d. $f'(x) > 0$ for $2 < x < 5$
e. $f'(5) = 0$
f. $f'(x) < 0$ for $5 < x < 8$
g. absolute maximum at x = -7
h. absolute minimum at x = 8
i. relative maximum at x = 5



2. Find the intervals on which g(x) is increasing or decreasing. Find the coordinates of all relative extrema. Justify all answers analytically.

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

$$g'(x) = \frac{(2x-2)(x+1) - (x^2-2x+1)(1)}{(x+1)^2}$$

$$g'(x) = \frac{2x^2 - 2 - x^2 + 2x - 1}{(x+1)^2}$$

$$0 = \frac{x^2+2x-3}{(x+1)^2}$$

$x^2+2x-3=0$
$(x+3)(x-1)=0$
$x=-3, 1$

$(x+1)^2 = 0$
$x=-1$

f'
$+ \quad - \quad - \quad +$
$-3 \quad -1 \quad 1$

$f'(-4) = \frac{16-8-3}{+} = \frac{+}{+}$

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

$f'(0) = \frac{-}{+} = -$

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

f is increasing $(-\infty, -3) \cup (1, \infty)$ because $f' > 0$ on the intervals

f is decreasing $(-3, -1) \cup (-1, 1)$ because $f' < 0$ on the intervals

REL MAX $(-3, -8)$ because f' changes from pos to neg at $x=-3$

$f(-3) = \frac{9+6+1}{-2} = -8$

REL MIN $(1, 0)$ because f' changes from neg to pos at $x=0$

3. Discuss the concavity. Give the coordinates of any inflection points. Justify all answers analytically.

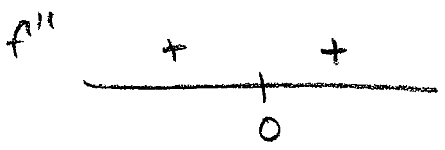
$$f(x) = 2x^4 - 8x + 3$$

$f'(x) = 8x^3 - 8$

$f''(x) = 24x^2$

$24x^2 = 0$

$x = 0$



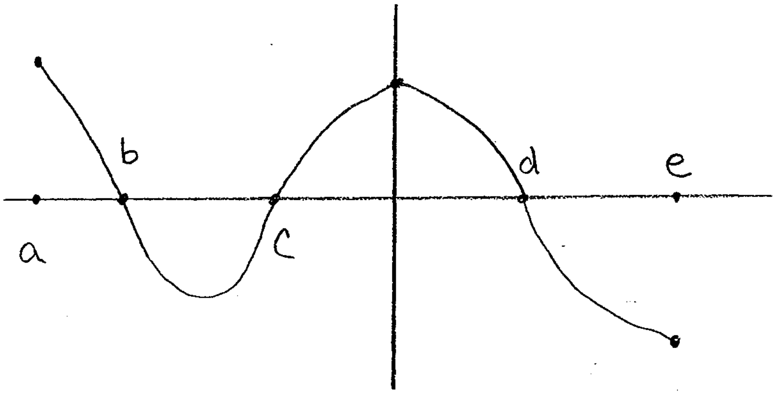
$f''(-1) = +$

$f''(1) = +$

f is conc up $(-\infty, 0) \cup (0, \infty)$ because $f'' > 0$ on the intervals

NO INFL PTS BECAUSE f'' NEVER CHANGES FROM POS TO NEG OR NEG TO POS

4. Below is a graph of f'' (x). Answer the following questions.



a. On what intervals is **f** concave down?

$(b, c) \cup (d, e)$ b/c $f'' < 0$

b. On what intervals is **f '** decreasing?

$(b, c) \cup (d, e)$ b/c $f'' < 0$

c. What are the critical numbers of **f'**?

x = b, c, and d because $f'' = 0$ at these x-values