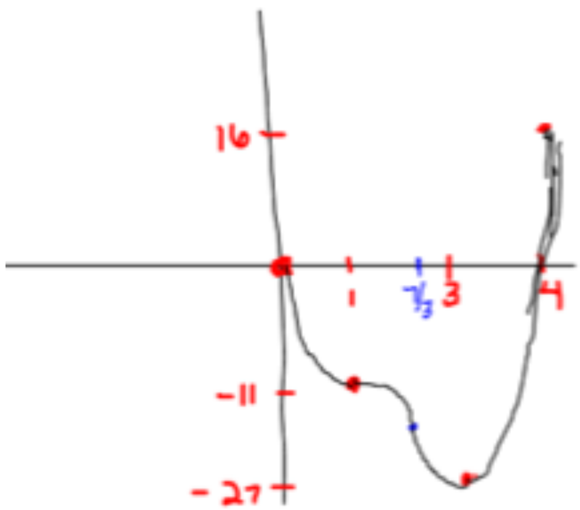
Math 1431 Test 3 Review KEY

1. abs max: (1, 1/5); abs min: (-2, -1/4)
2. incr: $(-\infty, -\sqrt{6}/2) \cup (\sqrt{6}/2, \infty)$; decr: $(-\sqrt{6}/2, \sqrt{6}/2)$
   local max: $(-\sqrt{6}/2, f(-\sqrt{6}/2))$; local min: $(\sqrt{6}/2, f(\sqrt{6}/2))$
3. Also list all extrema and points of inflection. Be able to explain your answers
   a. $f(x)$ is increasing on (-4,0) and(2, ∞) and decreasing on (- ∞ ,-4) and (0,2)
      $f(x)$ is concave up on (- ∞ , -3) and(1, ∞) and concave down on (-3,1)
   b. $f(x)$ is increasing on (0.3, 3.7) and decreasing on (- ∞ ,0.3) and (3.7, ∞)
      $f(x)$ is concave up on (- ∞ , 2) and concave down on (2, ∞)

4. Be able to do this with both the first and second derivative tests
   a. local min
   b. local min

5. a. be able to show this
   b. incr: (3,4); decre: (0,3)
   c. local min: (3, -27)
   d. abs max (4,16) and abs min (3,-27)
   e. c.u.: (0,1), (7/3, 4)
   f. c.d.: (1, 7/3)
   g. poi: (1,-11) and (7/3, -553/27)



   h.

6. your answers will vary

7. domain: all real #s, y-int: (0, -3) local min (-1, 10), local max (2, 17),
poi: (1/2, 7/2) – be able to graph too

8.

a. $f'(x) = 3x^2 \geq 0$ for all x => f(x) is always increasing => one-to-one
$f^{-1}(x) = (x-1)^{1/3}$

b. $f'(x) = 3 > 0$ for all x => f(x) is always increasing => one-to-one
$f^{-1}(x) = \dfrac{x-10}{3}$

c. $f'(x) = \dfrac{-x}{\sqrt{9-x^2}}$ => not one-to-one

9. $(f^{-1})'(1) = \dfrac{7}{2}$.

10. $\dfrac{2}{7}$

11. $\dfrac{1}{12}$

12. Find the derivative:

a. $y' = \dfrac{e^x + 4}{2\left(e^x + 4x\right)}$

b. $y' = \cos\left(\ln(5-x)^6\right)\left(\dfrac{-6}{5-x}\right)$

c. $y' = 2xe^{2x} + 2x^2e^{2x} + 2$

d. $f'(x) = \dfrac{\tan\sqrt{x}}{2\sqrt{x}}$

e. $f'(x) = \dfrac{xe^{\sqrt{x}} - 6\sqrt{x}e^{\sqrt{x}}}{2x^4\sqrt{x}}$

f. $y' = (\cos x)^{(x+7)}\left[\ln(\cos x) - (x+7)\tan x\right]$

g. $f'(x) = (3x-1)^{2x+6}\left[2\ln(3x-1) + \dfrac{6x+18}{3x-1}\right]$

h. $f'(x) = \dfrac{2}{x\ln 7}$

i. $y' = (-2)(\ln 6)6^{-2x}$