Name: ____________________

Clear your desk of everything excepts pens, pencils and erasers. If you have a question raise your hand and I will come to you.

1. (1 point) **Multiple Choice. No work needed. No partial credit available.** Suppose you are trying to approximate $(30)^{\frac{1}{3}}$ using Newton's Method. Which of the following is your best choice?
   A. $f(x) = x^3 - 30$, and initial approximation $x_1 = 3$.
   B. $f(x) = x^3 + 30$, and initial approximation $x_1 = 1$.
   C. $f(x) = x^{\frac{1}{3}} - 30$, and initial approximation $x_1 = 3$.
   D. $f(x) = x^{\frac{1}{3}} + 30$, and initial approximation $x_1 = 1$.

2. (1 point) **Fill-in-the-Blank. No work needed. No partial credit available.**
   Based on my choice above, the next approximation x_2 would be $28/9$.

Extra Work Space.

2

$x_1 = 3$

$F(x) = x^3 - 30$

$F'(x) = 3x^2$

$$x_2 = x_1 - \frac{F(x_1)}{F'(x_1)}$$

$$= 3 - \frac{(27-30)}{3(9)}$$

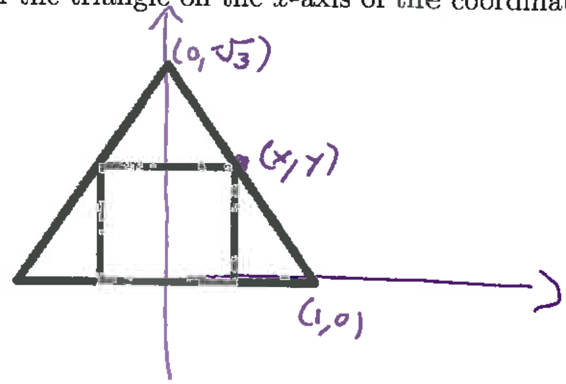
$$= 3 + \frac{3}{3(9)}$$

$$= 3 + \frac{1}{9}$$

$$= \frac{28}{9}$$

Continue on to back side

3. (3 points) Find the area of the largest rectangle that can be inscribed as shown in an equilateral triangle of side length 2. (Hint: Put the base of the triangle on the x-axis of the coordinate plane.)



$A = 2xy$ (x,y) is on the line $y = \sqrt{3} - \sqrt{3}x$

$y = \sqrt{3}(1-x)$

$A(x) = 2x(\sqrt{3}(1-x))$

$A(x) = 2\sqrt{3}(x - x^2)$

$A'(x) = 2\sqrt{3}(1-2x)$

$0 = 2\sqrt{3}(1-2x)$

$2x = 1$

$x = \frac{1}{2}$ } Must be the maximum because x is on the domain $[0,1]$ and the endpoints give trivial area.

$A(\frac{1}{2}) = 2(\frac{1}{2})(\sqrt{3}(1-\frac{1}{2}))$

$= 1 \cdot \sqrt{3} \cdot \frac{1}{2}$

$= \frac{\sqrt{3}}{2}$