Directions: Please answer the following questions and make sure your answer are legible. You \textit{must} show your work to receive credit for your answers. You may \textit{not} use a calculator (or any other technology) on this quiz. Good Luck.

1. (4 points) Solve the equation $|4 - x| - |x + 2| = 0$  

\[ 4 - x = x + 2 \quad \text{or} \quad 4 - x = -(x + 2) \]
\[ 2 = 2x \]
\[ x = 1 \]

2. (10 points) Let $f(x) = \frac{1}{3}|2x - 1|$  

(a) Sketch the graph of $f(x)$  
(b) Find the domain and range of $f(x)$  
(c) Find the coordinates of the $x$ and $y$ intercepts (if any) of the graph of $f(x)$.

(d) Find the absolute maxima and minima of $f(x)$, if none, say ‘none.’

More Questions on Back!
3. (3 points) Use completion of squares to write the polynomial $2x^2 - x + 2$ in the form $a(x+b)^2 + c$.

$$2x^2 - x + 2 = 2 \left( x^2 - \frac{1}{2}x \right) + 2 = 2 \left( x^2 - \frac{1}{2}x + \left( \frac{1}{4} \right)^2 \right) - \left( \frac{1}{4} \right)^2 + 2 = 2 \left( x - \frac{1}{4} \right)^2 - \frac{1}{8} + \frac{16}{8} = 2 \left( x - \frac{1}{4} \right)^2 + \frac{15}{8}$$

(CS # 5)

4. (5 points) Let $f(x) = 2x^2 - 4x - 1$

(a) Find the vertex of the parabola

(b) Sketch the parabola

(c) Does the vertex yield and absolute maximum or absolute minimum?

\[ a \left( x^2 - 2x + \frac{1}{4} \right) + 1(a) - 1 \]

\[ = 2(x-1)^2 - 3 \]

Vertex: \((1, -3)\)

X-intercepts: \((1+\sqrt{3}, 0) \) & \((1-\sqrt{3}, 0)\)

5. (3 points) Solve $y^2 - 3y = 4x$ for $y$

\[ y^2 - 3y - 4x = 0 \]

\[ (y - 3)^2 - \frac{9}{4} - 4x = 0 \]

\[ (y - \frac{3}{2})^2 = \frac{9 + 16x}{4} \]

\[ y = \frac{3}{2} \pm \sqrt{\frac{9 + 16x}{4}} \]

\[ y = \frac{3}{2} + \sqrt{\frac{9 + 16x}{4}} \quad \text{or} \quad y = \frac{3}{2} - \sqrt{\frac{9 + 16x}{4}} \]

(2.3 # 34)