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

1. (7 points) For \( f(x) = -3x^2 + 5x + 4 \) \( (2.3 \# 8) \)
   (a) Use Completion of squares to write \( f(x) \) in the form \( f(x) = a(x - h)^2 + k \)
   (b) Find the coordinates of the vertex.
   (c) Sketch the graph of \( f(x) \).
   (d) Is the vertex a relative and absolute maximum or minimum?

\[
\begin{align*}
\text{(a)} & \quad -3x^2 + 5x + 4 \\
& = -3\left(x - \frac{5}{6}\right)^2 + \frac{49}{4} \\
& = -3\left(x - \frac{5}{6}\right)^2 + \frac{49}{12} \\
& = -3\left(x - \frac{9}{12}\right)^2 + \frac{49}{12} \\
\end{align*}
\]

2. (5 points) What is the largest rectangular area one can enclose with 14 inches of string?
   You must show correct work for this question \( (2.3 \# 21) \)

\[
\begin{align*}
\text{Max Area} & \quad \text{formula for area} \\
A & = l \cdot w \\
A(w) & = (7-w)(w) \\
A(w) & = -w^2 + 7w \\
0 & = -w^2 + 7w \\
& = -(w^2 - 7w) \\
& = -(w - \frac{7}{2})^2 + \frac{49}{4} \\
\text{vertex} & \quad \left(\frac{7}{2}, \frac{49}{4}\right) \\
\text{solve for } l \text{ variable} \\

\text{Max Area} & \quad \frac{49}{4} \text{ in}^2
\end{align*}
\]

There are questions on both sides.
3. (10 points) Solve the following inequalities. Write your answer in interval notation.

(a) \(|3 - x| \geq x - 5\)  \(2.4 \# 16\)
(b) \(3x^2 \leq 11x + 4\)  \(2.4 \# 23\)

Alternate a

\[13 - x = \begin{cases} (3 - x) & \text{if } x > 3 \\ 3 - x & \text{if } x \leq 3 \end{cases}\]

- \((3 - x) \geq x - 5\)  \(-3x \geq -5\)  \(x \leq 5\)  \((-\infty, 5]\)
- \(3 - x \geq x - 5\)  \(8 \geq 2x\)  \(x \leq 4\)  \([-\infty, 4]\)

\([-\infty, 4] \cup [3, \infty)\)

4. (3 points) For \(p(t) = -t^2(3 - 5t)(t^2 + t + 4)\), find the following:  \(3.1 \# 8\)

(a) Degree 5
(b) Leading Term \(-5\)
(c) Leading Coefficient 5
(d) Constant Terms None, 0

\[\text{Lead term: } (-t^2)(-5t)(t^2 + t + 4) = 5t^5\]

\[\text{Smallest term: } (-t^2)(3)(4) = -12t^2\]