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. (8 points) Architecture A parabolic arch has a span of 120 feet and a maximum height of 25 feet.
   
   (a) Choose suitable rectangular coordinate axes and find the equation of the parabola.
   
   (b) Calculate the height of the arch at 10 feet from the center.

\[
\begin{align*}
\text{eqn of parab} & : f(x) = a(x-h)^2 + k \\
f(25) & = a(25-0)^2 + 25 \\
0 & = a(60-0)^2 + 25 \\
-25 & = a \cdot 60^2 \\
-25 & = 3600a \\
a & = \frac{-25}{60^2} \\
f(x) & = \frac{-25}{60^2} (x-0)^2 + 25
\end{align*}
\]

b) \[
\begin{align*}
f(10) & = \frac{-25}{60^2} (10)^2 + 25 \\
f(10) & = \frac{-25}{60} + 25 \\
f(10) & = \frac{-625}{36} + 25 \\
f(10) & = 25 - \frac{625}{36}
\end{align*}
\]

There is a question on the back!
2. (9 points) For \( f(x) = x^2(x - 2)(x + 2) \)

(a) Determine the end behavior of the graph of the function.
(b) Determine the zeros of the function and their multiplicity.
(c) Determine if the function touches or crosses the \( x \)-axis at each \( x \)-intercept.
(d) Draw a rough sketch of \( f(x) \).

3. (3 points) Find the domain of the rational function \( F(x) = \frac{3x(x - 1)}{2x^2 - 5x - 3} \)

\[ \frac{3x(x - 1)}{(2x + 1)(x - 3)} \]

Domain: \( (-\infty, -\frac{1}{2}) \cup (\frac{3}{2}, 3) \cup (3, \infty) \)