Calculus CH.3 Review #2   Name: _______________________________ Per: _____

Note all relevant properties of \( f \) and sketch the graph (label the maximum, minimum and inflection points)

1) \( f(x) = 6x^2 - x^4 \)

\[
\begin{array}{cccccccccc}
\text{x-int} & \text{y-int} & \text{v.asym.} & \text{h.asym.} & \text{rel.max.} & \text{rel.min.} & \text{inc.} & \text{dec.} & \text{inf.pts.} & \text{conc.up} & \text{conc.down} \\
\end{array}
\]

\[
\begin{array}{cccccccccc}
\text{x-int} & \text{y-int} & \text{v.asym.} & \text{h.asym.} & \text{rel.max.} & \text{rel.min.} & \text{inc.} & \text{dec.} & \text{inf.pts.} & \text{conc.up} & \text{conc.down} \\
\end{array}
\]

Note all relevant properties of \( f \) and sketch the graph (label the maximum, minimum and inflection points)

2) \( f(x) = \frac{-2}{x^2 - 1} \)  \( f'(x) = \frac{4x}{(x^2 - 1)^2} \)  \( f''(x) = \frac{-4 - 12x^2}{(x^2 - 1)^3} \)

\[
\begin{array}{cccccccccc}
\text{x-int} & \text{y-int} & \text{v.asym.} & \text{h.asym.} & \text{rel.max.} & \text{rel.min.} & \text{inc.} & \text{dec.} & \text{inf.pts.} & \text{conc.up} & \text{conc.down} \\
\end{array}
\]

3) **Find each indicated asymptote**

\( a) \ f(x) = \frac{8x^3 - 2x - 5}{7x - 3} \quad b) \ f(x) = \frac{5x - 7}{\sqrt{9x^2 + 8x - 2}} \quad c) \ f(x) = \frac{5x^2 - 7x + 1}{x - 3} \)

\[
\begin{array}{cccc}
\text{vert. asym.} & \text{horiz. asym.} & \text{oblique asym.} \\
\end{array}
\]

\[
\begin{array}{cccc}
\text{vert. asym.} & \text{horiz. asym.} & \text{oblique asym.} \\
\end{array}
\]
4) Graph from \([-3, 4]\)
\[f(-3) = 1 \quad f(-2) = 3 \quad f(0) = 0 \quad f(1) = 2 \quad f(4) = 3\]

\[f'(x) \quad \begin{array}{cccc}
+ & 0 & - & 0 & + \\
\hline
-2 & 0 & & & \\
\end{array}\]

\[f''(x) \quad \begin{array}{cccc}
- & 0 & + & 0 & - \\
\hline
-2 & 1 & & & \\
\end{array}\]

5) A rectangle is bounded by the x-axis and the equation \(y = \sqrt{200 - x^2}\).
   
   a) What length and width should the region be so that its area is a maximum?  
   
   b) What is the area?  

6) You have 1200 ft. of fencing and wish to fence off three adjacent rectangular fields as shown below.
   
   a) What length and width should the region be so that its area is a maximum?  
   
   b) What is the area?  

7) I need to fence off one field along a straight river. I need the area to be 1352 ft\(^2\).
   
   What length and width should the region be so that its perimeter is a minimum?  
   
   What is the perimeter?