1) Use Newton's Method to approximate the solution to: $x^3 = 3 - x$.
   Use $x_1 = 0.8$ as the initial guess.

   $x_1 = 0.8$  
   $x_2 = 1.37808199381$  
   $x_3 = 1.22948380268$  
   $x_4 = 1.21358305578$  
   $x_5 = 1.21341168253$  
   $x_6 = 1.21341166276$  
   $x_7$  

2) Find the absolute maximum and absolute minimum value(s) of
   $f(x) = 2x^3 + x^2 - 20x + 4$ over the interval $[-5, -1]$.

   $f'(x) = 2(3x^2 + x - 10) = 2(x - 3)(x + 3) = 0$  \( \Rightarrow \)  $x = \frac{1}{3}, -3$. Now, -3 is the only critical value in the given interval so:

   $f(-5) = -121$  Absolute minimum

   $f(-1) = 23$  Absolute maximum

   $f(-3) = 19$. 
3) Given \( f(x) = x^3 - 3x^2 + 3x + 7 \), determine:

a) Critical value(s)  
\[ f'(x) = 3(x-1)^2 = 0 \] 
so \( x = 1 \).

b) Critical point(s) 
\( (1, 8) \)

c) Intervals where \( f(x) \) is
Increasing: \( (-\infty, 1) \cup (1, \infty) \)
Decreasing: None

d) Intervals where \( f(x) \) is
Concave Up: \( (1, \infty) \)
Concave Down: \( (-\infty, 1) \)

e) Point(s) of inflection, if any:
\( (1, 8) \)

f) Relative Extrema: 
The second derivative fails, but the first derivative test (c), and part (d) we see that we have neither a relative max or a relative minimum.
4) A Ferris wheel with radius 25 feet is revolving at the rate of 10 radians per minute. How fast is a passenger rising when the passenger is 15 feet higher than the center of the Ferris wheel and is rising?

Want \( \frac{dy}{dt} \) at the instant \( y = 15 \).

Given: \( \frac{d\theta}{dt} = 10 \), and radius is 25.

We have \( \sin \theta = \frac{y}{25} \), so \( y = 25\sin \theta \).

Then \( \frac{dy}{d\theta} = 25\cos \theta \frac{d\theta}{dt} \).

At the instant \( y = 15 \), we have

\[
\cos \theta = \frac{20}{25}, \text{ so then } \frac{dy}{d\theta} = 25\left(\frac{20}{25}\right)(10) = 200.
\]

5) Evaluate:

\[
\lim_{x \to 0^+} (\sin x) \ln(\sin x) = \lim_{x \to 0^+} \frac{\ln(\sin x)}{1/\sin x} = \lim_{x \to 0^+} \frac{\ln(\sin x)}{\csc x} LR
\]

\[
\lim_{x \to 0^+} \frac{\cot x}{-\csc x \cot x} = -\lim_{x \to 0^+} \frac{1}{\csc x} = -\lim_{x \to 0^+} \sin x = 0.
\]