Math 30

Practice for Exam 2

1. Find the derivative of $y = \ln(x\cos^{-1}(2x))$

2. Find the absolute max and min of the function $f(x) = xe^{\frac{-x^2}{8}}$ on the domain $[-1, 4]$.

3. Sketch a graph which satisfies the following conditions:

   - $f'(x) > 0$ if $|x| < 3$
   - $f'(x) < 0$ if $|x| > 3$
   - $f'(-3) = 0$
   - $f''(x) > 0$ if $x \neq 3$

4. For the function $f(x) = \frac{2}{(x-1)(x-2)}$, find the following:

   a) any asymptotes

   b) any intervals of increasing or decreasing

   c) any maxima or minima

   d) any intervals of concavity

   e) any inflection points.

   Use the above information to sketch the graph of the function.

5. A rectangular storage container with an open top is to have a volume of 10 m^3. The length of its base is twice the width. Material for the base costs \$10 per square meter, and material for the sides costs \$6 per square meter. Find the cost of the materials for the cheapest such container.

6. Find $f(x)$ given that $f''(x) = 5 - 4x$, $f(1) = 1$ and $f(0) = -2$.

7. A bus is stopped and a woman is running to catch it. She runs at 6 m/s. When she is 13 meters behind the door, the bus pulls away with acceleration of .75 m/s^2. If the woman keeps running at her current speed, how long does it take her to reach the door?

8. Suppose the interval from 12 to 32 is divided into 20 equal subintervals.

   a) How long is each subinterval?

   b) If x is the left endpoint of the ninth subinterval, what does x equal?

   c) Consider the function $f(x) = x^3$ defined on the above subintervals. What is the area of the left rectangle whose base is the ninth subinterval? What is the area of the right rectangle whose base is the ninth subinterval?