University of Lethbridge
Department of Mathematics and Computer Science
MATH 1560 - Tutorial #6
Monday, February 26

Some additional practice (discuss the answers but don't write anything down):

1. Find the absolute (global) maximum and minimum values of the given function on the given interval:
   (a) $f(x) = x^2\sqrt{4 - x^2}$, on $[-2, 2]$.
   (b) $g(x) = x + \dfrac{3}{x}$, on $[1, 5]$.
   (c) $h(x) = e^x \sin(x)$, on $[0, \pi]$
2. Find all critical numbers for each function, and determine if each one is a local maximum, local minimum, or neither:
   (a) $f(x) = x^4 - 6x^2 + 4$
   (b) $g(x) = x^3 \ln(x)$
   (c) $h(x) = x^2 e^{-2x}$

1. Determine the global maximum and minimum values of the given function on the given interval. (Note: these values can occur at either a critical number or an end point.)

   (a) $f(x) = x^3 - x^2$, on $[-1, 2]$.

   (b) $g(x) = 3x^{2/3} - 2x$, on $[-1, 8]$.

2. Determine the intervals on which $f(x) = \dfrac{x^2+3}{x-1}$ is increasing and decreasing.

3. Sketch the graph of $f(x) = (x-3)\sqrt{x}$. You will need the following:

- The domain of f, and any x or y intercepts.
- The "end behaviour": are there any asymptotes?
- The first derivative, location of any critical points (turning points), and intervals of increase/decrease.
- The second derivative, location of any inflection points, and intervals of concave up/down.

4. Extra fun: The graph of the *derivative* of a **continuous** function f is given below. From the graph, determine:

   (a) The intervals on which f is increasing/decreasing.

   (b) The x-coordinates of any local maxima or minima.

   (c) The intervals on which f is concave up/down.

   (d) The x-coordinates of any inflection points.

   (e) A rough graph of f, assuming that $f(0) = 0$.