Calculus I **Concavity, graphing, optimization** **Fall 2014**

Discussion session 15 - 14 October 2014

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1. Describe, in your own words, the differences among the following expressions:

   (a) "local minimum" and "global minimum"

   (b) "interval of monotonicity" and "interval of concavity"

   (c) "$f(x)$ is zero," "$f'(x)$ is zero," and "$f''(x)$ is zero"

   (d) "intercept" and "asymptote"

2. Determine the intervals of concavity and the inflection points of the following functions:

   (a) $f(x) = \dfrac{3}{2x}$

   (b) $g(x) = 2\tan(x)$

   (c) $h(x) = \sin(x) + \cos(x)$

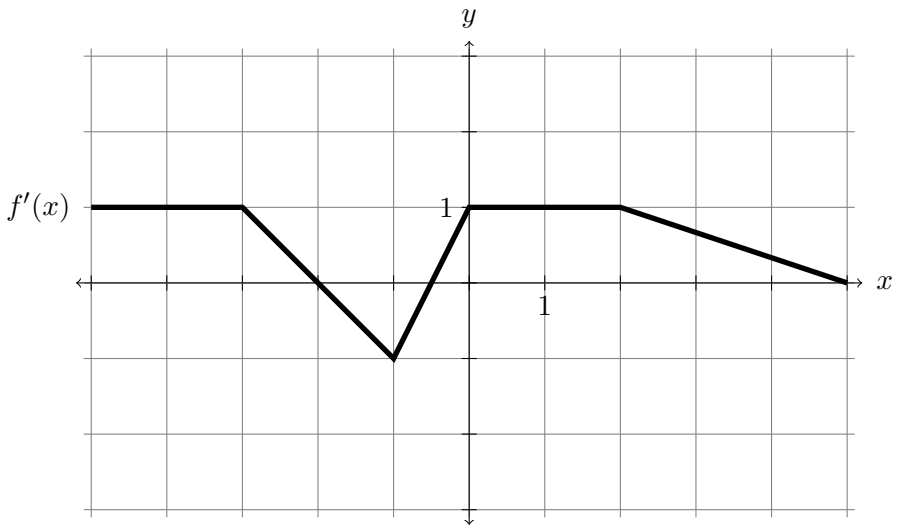
3. Determine the intervals of monotonicity of $f(x)$ if:

   (a) $f(x) = 2xe^{-x^2}$

   (b) $f'(x) = (x-2)(x-1)(x+1)(x+2)$

   (c) $f(x) = \dfrac{1 + \frac{1+x}{x}}{\frac{x}{x}}$

4. Let f be a continuous function defined on $[-5, 5]$. The graph of f', the derivative of f, is given in the diagram below.



(a) Draw f on the same diagram.

(b) Find the y-coordinates of the maxima and minima of f.

5. A rectangular sheet of paper with perimeter 36 inches is to be rolled into a cylinder. What are the dimensions of the paper that give the largest possible volume of the cylinder?

6. Farmer Joe has 56 feet of fencing to fence in his chickens. If Joe wants to have a rectangular yard for the chickens, with one side against the wall of his barn, what dimensions of the rectangle will give the largest area of the chicken yard?