Name:

Collaborators:

Section Day/Time:

Midterm 2 Practice

1. Use the limit definition of the derivative to find the derivative of $f(x) = \frac{x+1}{x+4}$.

2. Let $f(x) = \sqrt{5-x}$. Find $f'(x)$ using the limit definition of a derivative. Use the derivative to find $L(x)$, the tangent line approximation of $f(x)$ at $x = 1$

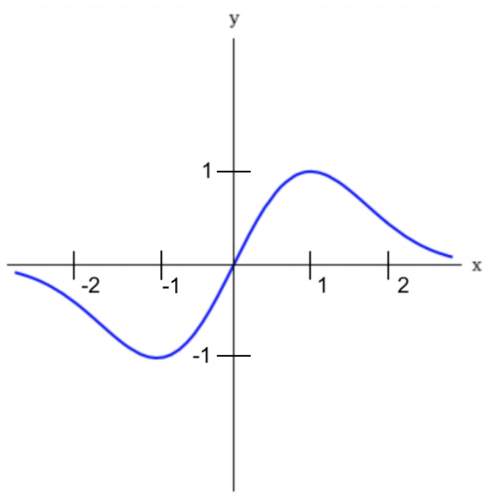
3. Find the derivative of each of the following functions

a) $f(x) = \frac{e^2}{\sqrt[3]{\ln(x+4)}}$

b) $xe^x \cdot 2^x + x^e \cdot \ln(2^\pi)$

4. Find dy/dx using implicit differentiation on the equation $\cos(x^2 + 2y) + xe^{(y^2)} = 1$.

5. Use the given graph of the function $f(x)$ below to sketch the graph of $f'(x)$ on the same set of axes. If this graph represents the position of a particle (in meters) at a given time (in minutes), explain where the particle is slowing down and speeding up using interval notation. (Use your best guess as to where changes are taking place.) What are the first and second derivatives measuring, and what are the units of each of these?



6. A swing consists of a board at the end of a 10 ft long rope. Think of the board as a point P at the end of the rope, and let Q be the point of attachment at the other end. Suppose that the swing is directly below Q at time $t = 0$, and is being pushed by someone who walks at 6 ft/sec from left to right. Find (a) how fast the swing is rising at $t = 1$ second; (b) the angular speed of the rope in radians/sec at $t = 1$ sec. (That is, find the speed at which the angle of the rope is changing at that point in time.)