MAC2311: Calculus 1 - Section 1

Quiz 3: Sections 3.8-3.11, 4.1-4.2 March 5, 2015

Name: _____

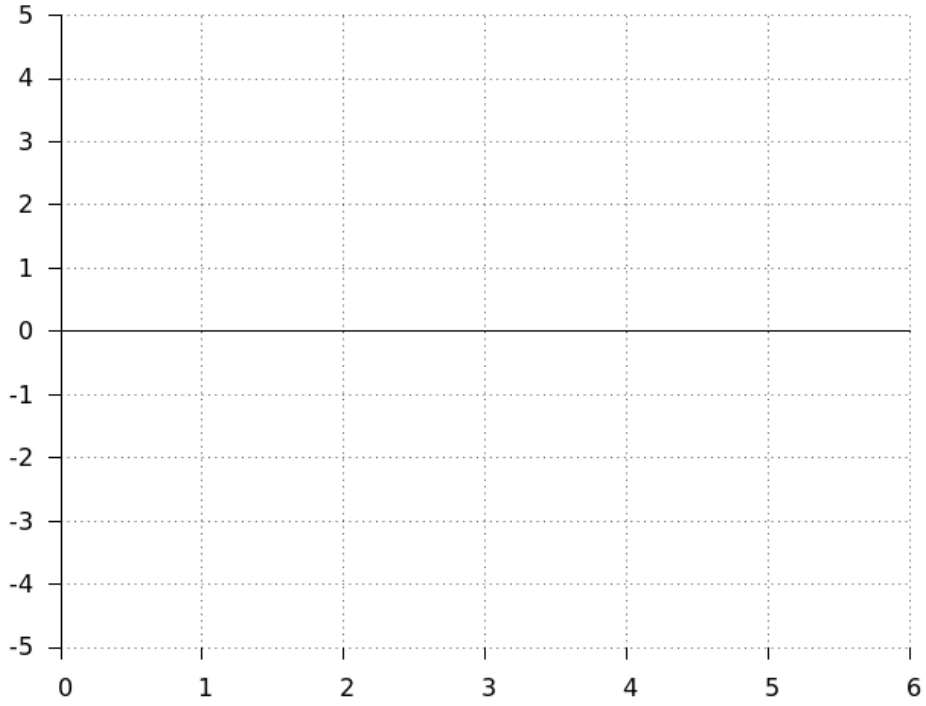
1. [5 points] The area (A) of a rectangle is 1 m^2 and its length $l(t)$ increases at a rate 4 m/s. At what rate is the width $w(t)$ of the rectangle changing when the length is 2 m? Use correct units in your final answer. (Hint: The area of the rectangle is $A = l(t) \cdot w(t)$.)

2. [5 points] In the following calculations, simplify your answers.
   (a) [2 points] Find the differential dy of the function $y = x \sin x$.

   (b) [3 points] Find the linearization $L(x)$ of the function $f(x) = x \sin x$ at $a = \frac{\pi}{2}$.

3. [5 points] Sketch the graph of a function f that is continuous on $[1, 5]$ and has the given properties:

   - absolute minimum at 5,
   - absolute maximum at 4,
   - local minimum at 2, and
   - no local minimum or maximum at 3, but 3 is a critical number.



4. [5 points] Verify that the function $f(x) = \sqrt{x}$ satisfies the hypotheses of the Mean Value Theorem on the interval $[0, 4]$, then find all numbers c that satisfy the conclusion of the Mean Value Theorem.