Your task is to design a test, taking into account learning objectives and problem difficulty. To keep this homework to a reasonable size, we will aim for a 20-minute test. Below is a sample/template.

Test Design

- Designer: ...name...
- Design Date: ...

Test Objectives

- This test is for the course ...MATH 2301 Calculus [or other 1xxx or 2xxx].
- We use the textbook: *Essential Calculus: Early Transcendentals.* by James Stewart, 2nd edition, Cengage, 2013. [There are various textbooks in 415 Morton you can use.]
- The test covers:
  - Section 2.2 The Derivative as a Function
  - Section 2.3 Basic Differentiation Formulas

  [Choose just enough to test on.]
- For these sections there are two learning objectives:
  - Conceptual: Students should understand the relationship between a function, its tanget lines, and the derivative of the function.
  - Computational: Students should be able to compute simple derivatives from the definition and use the power rule and derivatives of sin and cos.

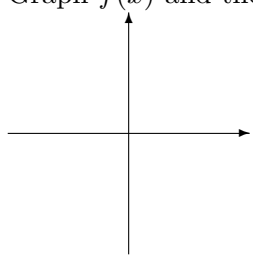
  [Have one Conceptual and one Computational.]

Problems

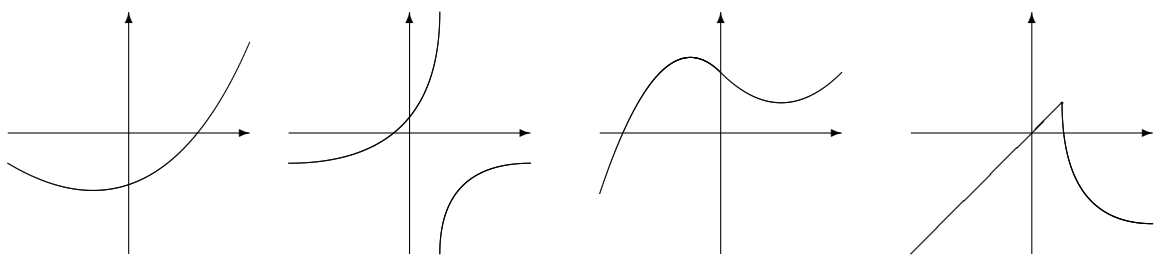
[Make your own.]

1. Let $f(x) = -x^2 + 3$.
   (a) State the definition of the derivative as a limit.
   (b) Using this definition, compute $f'(x)$.
   (c) Find the equation for the tangent line at $x = 2$.

(d) Graph $f(x)$ and the tangent line.



2. The graph of a function f is given in each part below. On the same axes, sketch the graph of f'.



3. Compute the following derivatives:

   (a) $f(x) = 2 + x - 5x^7 + 3\sin(x) \Rightarrow f'(x) =$

   (b) $\dfrac{d}{dx}\left[\dfrac{3}{x} - \sqrt{x} + x^{3/4} + \cot(x) - \sin(7)\right] =$

Problem Analysis

We analyze the problems with respect to the objectives and difficulty.

	Easy	Hard	Row point total
Conceptual	1.(a) 5 points 1.(c) 5 points 1.(d) 5 points	2. 20 points	35
Computational	1.(b) 5 points 3.(a) 10 points	3.(b) 10 points	25
Column point total	30	30	60

I think this is an appropriate mix because ....