

Math 118 Practice First Midterm

1. For each of the following functions, compute the slope of the tangent line to the graph at the point indicated.

(a) $f(x) = 3x^2 + 2x + 7$, at $x = -1$

(b) $g(x) = \frac{1}{x}$, at $x = 3$

2. It's well known that the number of whiskers on a yeti's head is proportional to the cube of the yeti's height. If a 2-meter-tall yeti has 1000 whiskers, how tall is a yeti that has 700 whiskers?
3. Let $f(t)$ be the average height of a t -year-old female in the United States in the years 1999-2002. We have the following data (from the CDC):

t	$f(t)$
11	59.6
12	61.4
13	62.6
14	63.7

- (a) Estimate $f'(14)$.
- (b) Use your answer to (a) to estimate the average height of a 15-year-old female.
4. Becky's heart rate, H (measured in beats/minute), is a function of the amount of coffee she's drunk, c (measured in liters), so $H = f(c)$.
- (a) Explain, in words, the meaning of the following expressions or equations. (Your explanations should be understandable by someone who hasn't taken calculus. Units may be helpful.)
- (i) $f(2) = 120$
- (ii) $f^{-1}(90)$
- (iii) $f'(2) = 30$
- (b) Use the information above to estimate her heart rate when she's drunk 1.5 liters of coffee.
5. State the limit definition of the derivative $f'(a)$.
6. My arch-enemy Sideshow Bob has started a monkey colony in my attic, and they're reproducing. After t months, there are $m(t) = 10e^t$ monkeys in my attic.
- (a) How long does it take for the number of monkeys to triple?
7. You know two things about the function $f(x)$: $f(0) = 0$, and the graph of $f'(x)$ is as shown below. (That's $f'(x)$, **not** $f(x)$!) Sketch the graphs of $f(x)$ and $f''(x)$.

