Math 1120	Calculus	Final Exam

May 9, 2005

Name

The first part of the test counts 120 points and the second part counts 125 (5 points for each question).

- 1. (8 points) The line tangent to the graph of a function f at the point (2, 5) on the graph also goes through the point (0, 7). What is f'(2)?
- 2. (8 points) What is the slope of the line tangent to the graph of $f(x) = x x^{-2}$ at the point (2,7/4)?
- 3. (12 points) Let f(x) = 1/(3x).
 - (a) Find f'(x).

(b) Find f'(2)

- (c) Use the information found in (b) to find an equation for the line tangent to the graph of f at the point (2, 1/6).
- 4. (10 points) Find the rate of change of $f(t) = e^{2t} \cdot \ln(t)$ when t = 1.

5. (10 points) A radioactive substance has a half-life of 27 years. Find an expression for the amount of the substance at time t if 20 grams were present initially.

6. (10 points) If $h = g \circ f$ and f(1) = 2, g'(2) = 5, f'(1) = -3 find h'(1).

- 7. (12 points) Let $f(x) = x^4 + 2x^3 6x^2 + x 5$.
 - (a) Find the interval(s) where f is concave upward.

(b) Find the inflection points of f, if there are any.

8. (12 points) Find the area of the region R bounded above by the graph of f(x) = -(x+1)(x-3), below by the x-axis, and on the sides by the vertical lines x = 0 and x = 2.

9. (12 points) Find the area of the region R caught between the graph of $f(x) = x^2 - 3x + 2$ and g(x) = -x + 5.

10. (8 points) Evaluate $\int x^2 - \sqrt{x} \ dx$

- 11. (12 points) Evaluate $\int_1^3 x^3 \cdot (x^4 2)^2 dx$
- 12. (12 points) Evaluate $\int_0^4 2x e^{x^2} dx$