Mathematics 25 Midterm II, version 1
October, 2009

Ordinary scientific calculators are allowed on the exam; no calculators with graphing or symbolic capabilities are allowed.

Show all your work for full credit. Try to present your work in an organized fashion; to do this, it might be helpful to do rough work on scratch paper, and then to write up an organized answer in your exam book.

1. Find the derivative of the following functions:

(a) $f(x) = \sin(x)\sqrt{1+2x}$

(b) $f(x) = 15(3^x)$

(c) $f(x) = \ln(1+x^3)$

2. Find the derivatives of the following functions:

(a) $f(x) = \dfrac{\sqrt[3]{1+x}}{(1+x)^3(x^2-5)^4}$. Hint: Logarithmic differentiation is useful.

(b) $f(x) = x^{1+x^2}$

3. Car A is travelling west along a straight road, and car B is travelling north along a straight road, and both are approaching an intersection of the two roads. Suppose car A has speed 30 mph and car B has speed 40 mph. At what rate is the distance between the two cars decreasing when car A is 1 mile from the intersection and car B is 2 miles from the intersection?

4. A sample of radioactive Goodmonium with initial mass 100 mg decays so that the amount left after one year is 93 mg. Compute the half–life of Goodmonium and find the amount of Goodmonium left after 20 years.