

**Second Practice Midterm**

The Second Midterm will be on Tuesday March 23rd at 8:20pm. Here the locations:

**LECTURE 1:** JAVITS 102, **LECTURES 2 and 3:** JAVITS 100, **ELC 90:** JAVITS 101

**Important:** Solutions to these questions are posted at:

<http://www.math.sunysb.edu/~disconzi/Teaching/MAT123-Spring-10/SolutionsPracticeMidterm2/>

Moreover: check the webpage to get a copy of Second Midterm of Fall 2008!

**Question 1.** Compute:

- (a)  $\log_2(16)$       (b)  $\ln e^3 + \log \frac{1000}{0.1} - \log_3 81$   
(c)  $\log_3 \sqrt{3}$       (d)  $7^{\log_7 23}$

**Question 2.** Solve for  $x$ :

- (a)  $125^x = 625$       (b)  $5^{2-x} = \frac{1}{25}$   
(c)  $8^{1-x} = 4^{x+2}$       (d)  $\log_3(x-5) + \log_3(x+3) = 2$   
(e)  $2 \log_4(x+5) - \log_4 x - \log_3 9 = 3$       (f)  $\log(2x-1) = \log(x+3) + \log 3$

**Question 3.** If it takes 10 years for a radioactive substance to decay by 30% of its value, find its half-life assuming continuous-exponential decay.

**Question 4.** The half-life of the radioactive element plutonium-239 is 25,000 years. If 16 grams of plutonium-239 are initially present, how many grams are present after 25,000 years? 50,000 years? 100,000 years?

**Question 5.** If some material contains originally 320 grams of carbon-14, how many grams will it contain after 4,000 years?

**Question 6.** A radioactive substance decays from 200 grams to 130 grams in 2,000 years. Assuming continuous-exponential decay, determine its half-life. How many years will it take to decay to 80 grams? And how much of the substance will remain after 3,000 years?

**Question 7.** Graph the given functions:

- (a)  $f(x) = \frac{x^2+1}{x}$       (b)  $f(x) = \frac{x^2+x-6}{x-3}$       (c)  $f(x) = \frac{x^3-1}{x^2-9}$   
(d)  $f(x) = \frac{x^2-4x-12}{x^2+4x+3}$

**Question 8.** Consider a house whose floor is rectangular. Suppose that the area of the floor is 2200 square feet. Express the perimeter of the floor as a function of its width.

**Question 9.** Consider a building whose shape is in form of a rectangular box and whose base is a square of area 1000 m<sup>2</sup>. Express the surface area of the building as a function of its height (ignore contributions from intermediate floors inside the building).