Math 120
Exam #4
Summer II - 2010

Name:

1. [10 pts. each] Solve each equation.

   (a) $16^{2x-1} = 64^{3x}$

   (b) $4 = r^{2/3}$

   (c) $y = \log_8 \sqrt[4]{8}$

   (d) $\log_x 3 = -1$

2. [10 pts. each] Solve each equation. When solutions are irrational, give them as decimals correct to four decimal places.

   (a) $6^{x+3} = 4^x$

   (b) $500(1.05)^{x/4} = 200$

   (c) $\ln(3x + 8) = \ln(18)$

   (d) $\log_2 x + \log_2(x + 2) = 3$

   (e) $\log(x^2) = (\log x)^2$

3. [10 pts.] Find the required annual interest rate to the nearest tenth of a percent for \$1200 to grow to \$2000 if interest is compounded quarterly for 5 years.

4. [10 pts.] How long will it take for an investment to triple in value, if interest is compounded continuously at 5%?

5. [10 pts. each] The amount of radioactive material, in grams, present after t days is modeled by $A(t) = 500e^{-0.0012t}$.

   (a) Find the amount present after three weeks.

   (b) Find the half-life of the material.

6. [15 pts.] Cobra Commander has 200 grams of kaboomium-320 in the basement of his secret hideout. Upon returning from a carefree 4-hour drive with Destro in the countryside in his spiffy new Nissan Cube, he finds that 192 grams remain. After how many hours will only 12 grams remain? Recall that the basic model for a radioactive decay process is $A(t) = A_0e^{-kt}$, so here A_0 and k will need to be determined first.

7. [10 pts. each] Solve each system of equations.

   (a)

   $$\begin{cases} 2x - 3y = -7 \\ 5x + 4y = 17 \end{cases}$$

   (b)

   $$\begin{cases} 4x - y + 3z = -2 \\ 3x + 5y - z = 15 \\ -2x + y + 4z = 14 \end{cases}$$

EXTRA CREDIT (25 pts.) Graph the ellipse $\dfrac{(x-2)^2}{25} + \dfrac{(y-1)^2}{4} = 1$. Identify the domain, range, center, vertices, endpoints of the minor axis, and the foci.