Math 128 Practice Final December 2003

This exam has 23 questions.

For answers in dollars, round to the nearest dollar

1. You win \$1 million in the lottery and will be paid \$50,000 per year for 20 years. Assuming an interest rate of 8%, what is the present value of that payout?

   a. \$726,815

   b. \$715,815

   c. \$676,815

   d. \$643,815

   e. \$603,815

   f. \$569,815

   g. \$513,815

   h. \$498,815

2. You have an income stream of $1000e^{.02t}$. As the money comes in you invest it at an interest rate of 8%, compounded continuously. How much *interest* will you accumulate in 10 years?

   a. \$3,025

   b. \$3,147

   c. \$3,756

   d. \$4,335

   e. \$4,872

   f. \$5,022

   g. \$5,148

   h. \$5,666

3. What is the average value of the function $f(x,y) = \sin(x+y)$ on the square $R = \{(x,y) | \ 0 < x < \pi/4, \ 0 < y < \pi/4\}$?

   a. $\frac{1}{\pi^2}(\sqrt{2}-1)$
   b. $\frac{4}{\pi^2}(\sqrt{2}-1)$
   c. $\frac{16}{\pi^2}(\sqrt{2}-1)$
   d. $\frac{1}{\pi^2}(\sqrt{2}-1)$
   e. $(2-\sqrt{2})$
   f. $\frac{1}{4}(\sqrt{3}-\sqrt{2})$
   g. $\frac{1}{2}(2\sqrt{2}-1)$
   h. $4\sqrt{2}-2$

4. Minimize $x^2 + 4y^2 + 5$ subject to the constraint $xy = 1$.

   a. There is no minimum.
   b. 4
   c. 5
   d. 6
   e. 7
   f. 8
   g. 9
   h. 10

5. The Lorenz curve for income distribution in a country is given by the formula $f(x) = e^{-1}xe^x$. Compute the associated Gini index.

   a. $1/(e-2)$
   b. $1-2/e$
   c. $1-1/e$
   d. $1/2+1/e$
   e. $1/e$
   f. $e/3$
   g. $e/4$
   h. $2/e$

6. Suppose $y(x)$ is the solution of the differential equation

$$y' + 2xy = e^{-x^2}$$

   which satisfies the initial condition $y(0) = 1$. What is $y(1)$?

   a. e^2
   b. $2e^2$
   c. $e+e^2$
   d. $e-e^2$
   e. e^{-1}
   f. $e+e^{-1}$
   g. $2e^{-1}$
   h. e^2+1