Math 124 - Section 012
Practice Problems for Test 4

Problems similar to these may show up on the test, but this is not a comprehensive review.

1. A wet summer is causing a mosquito population explosion in a lake resort area. The number of mosquitos is increasing at an estimate rate of $200 + 10e^{0.8t}$ per week (where t is measured in weeks). By how much will the mosquito population increase between the fourth and eighth weeks of summer?

2. Find the **exact** area enclosed by the curves $y = -x^2 + 3$ and $y = \frac{1}{2}x^2$. (Decimal approximations will receive no credit.) Draw a picture showing the area you have found.

3. Let a be a constant. Compute $\displaystyle\int_0^{\frac{\pi}{4}} \frac{a+\cos^3 t}{\cos^2 t} dt$ in terms of a.

4. Estimate $f(x)$ for $x = 4, 6, 8$ using the values for $f'(x)$ in the table below and the fact that $f(2) = 10$.

x	2	4	6	8
$f'(x)$	20	12	9	1
$f(x)$	10			

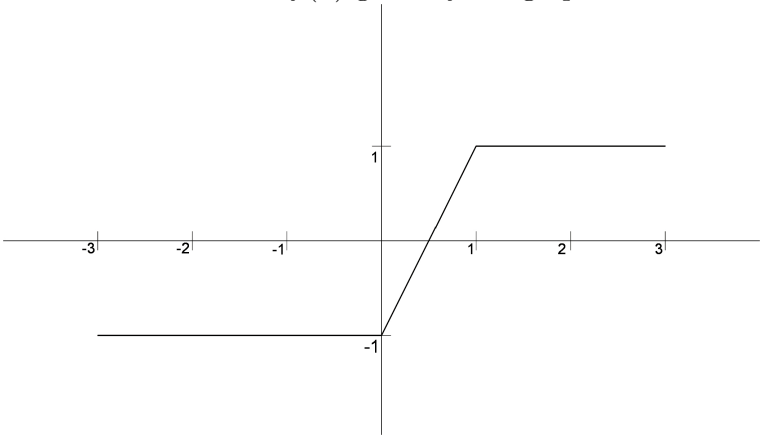
5. Solve the initial value problem $\frac{dy}{dt} = t\sqrt{t}$, $y(1) = -1$.

6. The value, V, of a piano owned by Glenn Gould was $\$200,000$ in 1985 and has risen by 10% per year since then. The value of the piano in dollars t years after 1985 is given by

$$V = 200000(1.10)^t.$$

Find the average value of the piano over the period 1985-2000. Give an exact answer and a decimal approximation.

7. Consider the function $f(x)$ given by the graph below:



Draw the graph of an antiderivative, F, of f such that $F(0) = 0$.

8. Circle TRUE or FALSE for each of the following: (Assume that f is a continuous function.)

   a. TRUE or FALSE: $F(x) = \int_1^x f(t)dt$ is a differentiable function of x.

   b. TRUE or FALSE: If $Si(x) = \int_0^x \frac{\sin t}{t} dt$, then $\frac{d}{dx}(xSi(x)) = \sin x + Si(x)$.

   c. TRUE or FALSE: If F is differentiable and $F'(x) \leq 2$ for all x, then $F(7) - F(4) \leq 6$.

   d. TRUE or FALSE: $\int_a^{2\pi} 2(\cos x)(\sin^2 x)dx$ is a function of a.

   e. TRUE or FALSE: $\frac{d}{dx} \int_a^x f(t)dt$ depends on the value of a.

   f. TRUE or FALSE: If H is an even function such that $H' = h$, then every antiderivative of h is an even function.