Math 125A - Spring 2003
Mid-Term Exam Number One
April 24, 2003

Name: _____ Section: _____

1	10	
2	15	
3	10	
4	10	
5	10	
6	10	
7	10	
Total	75	

- This exam consists of 7 problems. Be sure that you complete all 7 problems.
- You may use a scientific (non-graphing) calculator during this examination. Other electronic devices are not allowed.
- You may use one hand-written 8.5 by 11 inch page of notes. You can use both sides of the note page.
- Show all work for full credit.
- Unless the problem specifies an approximation, an exact answer should be given.
- Mechanisms are in place to render cheating detectable and ineffective.
- You have 80 minutes to complete the exam.

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1. Find the derivative of each of the following functions.

(a) $f(x) = \int_{-2}^{x^2} e^{t^3}\, dt.$

(b) $g(x) = \int_{\ln x}^{\sin x} \sin(t^2)\, dt.$

2. Evaluate the following integrals.

(a) $\int x\sqrt{x+2}\,dx$

(b) $\int \dfrac{dx}{x(\ln x)^3}$

(c) $\int \dfrac{\sin x}{1+\cos^2 x}\,dx$

3. Consider the region R in the first quadrant bounded by $y = x^2$, $y = -\frac{1}{2}x + 5$ and the x-axis. Find the volume of the solid of revolution created by revolving R about the x-axis.

4. Consider the region S bounded by $y = \sqrt{x}$, $y = \frac{1}{2}x$, $x = 1$ and $x = 2$. Find the volume of the solid of revolution created by revolving S about the line $x = 4$.

5. Find the value of $k > 0$ so that the region bounded by $y = x^k$ and $y = x^{1/k}$ has area $\frac{3}{4}$.

6. Use the Midpoint Rule with $n = 4$ to estimate the area of the region bounded by $y = \sin\left(\frac{1}{x}\right)$, $y = 0$, $x = 1$ and $x = 2$.

7. An accident occurred at the Tasty Foods company, and a lot of radioactive gas was released. A tree nearby was severely affected, and it started growing at an unnatural rate. Research has shown that trees affected by this kind of radiation grow at a rate (in meters/day) given by

$$r(t) = at^2$$

where t is the time (in days) since the exposure to the radiation, and a is a positive constant.

Ten days after the radiation leak the tree was 5 meters tall. After 20 days it was 10 meters tall. When will the tree be 20 meters tall?