You are: _____   _____   _____
                    Name   Section   Student #

Problem	Total Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

Instructions

1. Print your **Name, Section** and **Student #** on this page.
   Do **NOT** separate the pages of the exam. Check to see that your exam has 6 pages.

2. **SHOW ALL OF YOUR WORK.** Partial credit will only be given where you have made it clear that you understand part of the solution. Answers without justification may not receive full credit. Correct answers may receive no credit if you do not show how you arrived at them.

3. **GIVE EXACT ANSWERS.** You will lose points if you do not give the exact answer to a problem and instead provide a decimal approximation (for example, as supplied by your calculator).

4. You are allowed to use one $8\frac{1}{2} \times 11$ page of handwritten notes. Do not share notes. You may use a Ti-30x IIS calculator (no other brands or models are allowed). If you need more space to solve a problem, use the back of the page preceding that problem and indicate to the grader that you have done so.

5. You may use any of the 20 integrals from the table on p. 495 (in §7.5) of the text without deriving them. You must show your work in evaluating any other integrals (other than the integral of $\sec^3 x$), even if they are on your note sheet.

6. Read each question carefully. Work the problems in an order that will maximize your score. Be clear and concise. **Good luck!**

1. (10 points) Evaluate the following indefinite integrals. Show all of your work.

(a) (5 points)

$$\int \frac{\sin(\pi\sqrt{t})}{\sqrt{t}}\,dt$$

(b) (5 points)

$$\int \frac{dx}{\sqrt{x} - \sqrt[3]{x}}$$

(**Hint**: Use the substitution $x = u^p$ for a particular choice of the exponent p.)

2. (10 points) Evaluate the following definite integrals. Show all of your work.

(a) (5 points)

$$\int_0^1 \frac{x^3 + 2x}{x^4 + 4x^2 + 3} \, dx$$

(b) (5 points)

$$\int_0^{1/2} \sin^{-1}(x) \, dx$$

3. (10 points) Let R be the region that is between the curve $y = \sqrt{x}\, e^{-x^2}$ and the x-axis, is bounded on the left by the line $x = 1$, and extends infinitely far out to the right. Let S be the solid obtained by rotating R around the x-axis.

Does S have finite volume? If so, find it, and give your answer in exact form.

4. (10 points) A 1600-lb elevator is suspended by a 200-ft cable that weighs 10 lb/ft. How much work is required to raise the elevator from the basement to the third floor, a distance of 30 ft?

5. (10 points)

(a) (4 points) Use Simpson's rule with $n = 4$ subintervals to approximate the integral

$$\int_1^3 \ln x \; dx.$$

Give your answer in *EXACT* form (involving numbers like $\ln(3)$, etc.).

DO NOT GIVE A DECIMAL APPROXIMATION in this part.

(b) (4 points) Compute the integral

$$\int_1^3 \ln x \; dx$$

exactly.

DO NOT GIVE A DECIMAL APPROXIMATION in this part.

(c) (2 points) Use your calculator to evaluate your answers in part (a) and part (b) as decimals; round your answers to six decimal digits after the decimal point.