Print Your Name

Student ID #

Problem	Total Points	Score
1	12	
2	12	
3	6	
4	5	
Part 1 Total	35	

Directions

- Please check that your exam contains a total of 5 pages.
- Show all your work or you may not receive credit.
- Place a box around your FINAL ANSWER to each question.
- You may use one 8.5×11 handwritten sheet of notes and a non-graphing calculator.
- If you use a trial and error (guess and check) or other numerical method when an algebraic method is available, you will not receive full credit.
- If you use an integral from a table other than those found on the back of this page, you will not receive full credit.

Signature. Please sign below to indicate that you have not and will not give or receive any unauthorized assistance on this exam.

Signature: ______________________

1. (12 total points) Compute the following integrals:

   (a) (6 points) $\int_1^e (\ln x + 1)\ dx$

   (b) (6 points) $\int t \sin(11t)\ dt$

2. (12 total points) For each of the following, tell whether the integral converges or diverges. If it converges, determine the value of the integral. If it diverges, explain why.

   (a) (6 points) $\displaystyle\int_{10}^{\infty} \frac{1}{4x^2}\, dx$

   (b) (6 points) $\displaystyle\int_{0}^{1} \frac{1}{x(x+1)}\, dx$

3. (6 points) Do ONE of the the following integrals. Clearly indicate which integral you have chosen to compute.

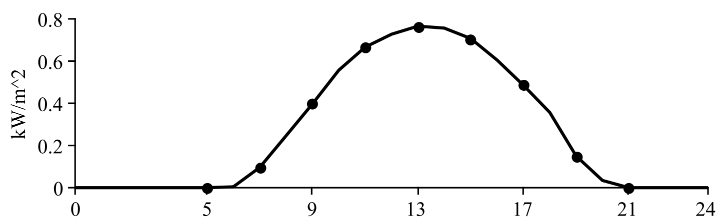
$$\int \frac{\sec^2 y \tan y}{\tan^2 y + 4\tan y + 3}\, dy \quad \text{OR} \quad \int \frac{1}{x^2\sqrt{x^2-1}}\, dx$$

4. (5 total points) We want to calculate the amount of solar energy per square meter that reached the University of Washington on the very hot day of July 29, 2009. The formula is

$$E = \int_0^{24} I(t)\,dt,$$

where $I(t)$ is the intensity of solar radiation in at time t, measured in kW/m^2, t is the number of hours after midnight on July 29, and E is measured in kWh/m^2.

The following table gives the measured intensity of solar radiation at the University of Washington weather station.



t	5	7	9	11	13	15	17	19	21
I(t)	0	.0959	.3973	.6665	.7659	.7075	.4858	.1502	0

(a) (2 points) There was no solar radiation before 5:00 or after 21:00. Using the properties of integrals, explain why $\int_0^{24} I(t)\,dt = \int_5^{21} I(t)\,dt$.

(b) (3 points) Use Simpson's rule with $n = 8$ to estimate $\int_5^{21} I(t)\,dt$.

This is the amount of energy that reached each square meter of campus that day. As a comparison, the average U.S. household uses about 27 kWh per day.