1. PRACTICE FOR EXAM 2

1. Consider the region in quandrant I, bounded by the y axis, $y = 2x^2$ and $y = 3 - x$ If the density is $\delta(x) = 1 + x$, find the total mass of the region.

2. An object travles along the curve given below. Find the total length traveled. $x = 5\cos(t^5), \qquad y = 5\sin(t^5) \qquad 0 \le t \le \pi.$

3. Use the comparison test to determine whether the following integrals converges of diverges. If the integral converges, find an upper bound for the integral. Show your work and explain your reasoning.

$A. \displaystyle\int_1^\infty \frac{\arctan x}{x^3+5}\,dx \qquad B. \int_1^\infty \frac{1}{\sqrt{y^3+y^4}}\,dy \qquad C. \int_1^\infty \frac{\sin^2 x + 1}{x^2+1}\,dx$

$D. \displaystyle\int_0^1 \frac{x}{\sqrt[3]{x^2+1}}\,dx \qquad E. \int_0^1 \frac{2}{y^2}\,dy \qquad F. \int_2^\infty \frac{(\sin^2 x + 1)\,x}{x^2-1}\,dx$

4. Determine if the improper integral converges or diverges. If the integral converges, evaluate the integral.

$A. \displaystyle\int_2^\infty \frac{dx}{x(\ln x)^2} \qquad B. \int_2^4 \frac{1}{(x-3)^3}\,dx \qquad C. \int_1^\infty \frac{x}{x^2+3}\,dx$

5. Calculate the volume of the solid generated by rotating the region in quadrant I bounded by $y = x^2$ and $y = 2 - x$ around the x-axis.

6. Calculate the volume of the solid generated by rotating the region in quadrant I bounded by $y = 2^x$, $y = 10$, and $x = 2$ around

A. The line $y = 10$ *B*. The line $y = -2$ *C*. The line $x = 2$.

7. Calculate the volume of a cone with radius r and height h by rotating the line $y = \frac{r}{h}x$ around the x-axis.

8. The velocity of blood flowing through an artery is proportional to the difference between the square of the artery's radius, R, and the square of the distance, r, of the fluid of the center of the artery. Find the total flow of blood through the artery.

9.

Exercise 8.7.6

Exercise 8.7.9

Find the pdf and cdf in both problems.

10. Exercise 8.8.4:

The probability of a transistor failing between $t = a$ months and $t = b$ months is given by

$$c \int_a^b e^{-ct}\, dt,$$

for some constant c.

A. If the probability of failure within the first six months is 10%, what is c?

B. Given the value of c in part (a), what is the probability the transistor fails within the second six months?

11. Find a formula for s_n, $n \geq 1$.

A. $\frac{1}{3}, -\frac{1}{5}, \frac{1}{7}, -\frac{1}{9}, \frac{1}{11}, ...$

B. $\frac{13}{5}, \frac{13}{9}, 1, \frac{13}{17}, \frac{13}{21}, \frac{13}{25}, ..$

12. For each of the following infinite geometric series, determine if the sum exists. If it exists, find the sum.

A. $4 - 2 + 1 - \frac{1}{2} + \frac{1}{4} - ...$

B. $1 + 3 + 9 + 27 + 81....$

13. Find the following sums.

$A.\ \sum_{n=2}^{8} 2\,(\frac{1}{3})^n$

$B.\ \sum_{n=1}^{\infty} 2\,(\frac{1}{3})^n.$

14. Set up the integral and evaluate the integrals in the following problems:
Exercise 8.1.11
Exercise 8.1.12
Exercise 8.1.13
Exercise 8.1.14