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.

$A. \displaystyle\int_2^\infty \frac{dx}{x(\ln x)^2} \qquad B. \int_0^\infty \frac{1}{x^2+2}\,dx \qquad C. \int_1^\infty \frac{x}{x^2+3}\,dx$

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. A conical tank with radius 2 ft and height 4 ft, pointing downward, is buried 2 feet underground. The tank contains water and the depth of the water in the tank is 1 ft. (The density of water is 62.4 Ibs/ft^3.) How much work is needed to pump the water to the surface if the variable is given as

A. The distance between the vertex of the cone and the 'slice' ?

B. The distance between the top of the cone and the 'slice' ?

C. The distance between the surface and the 'slice' ?

D. The distance between the final level of the water and the 'slice' ?

10. A cylindrical tank of radius 2 ft and height 10 ft is full of water. How much work is need to pump all of the water out of the tank to a point 1 feet above the tank? (The density of water is 62.4 Ibs/ft^3)

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. Suppose a crane, 30 ft above the ground, using chain that weighs 2 Ib/ft, lifts a 500 Ib stone to a height of 20 ft. Calculate the work required.

15. 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