

Math 1210-1 Final Review

This is a review on Chapter 6 and only chapter 6. To review the previous material, study the previous review sheets and tests. You will be responsible for all of the material we have covered this semester.

1. Explain the difference between evaluating a definite integral of a function and finding the area enclosed by the graph of a function.
2. Graph the following functions and find the area of the regions bounded by the functions:
 - (a) $y = x + 4$ and $y = x^2 - 2$
 - (b) $x = (3 - y)(y + 1)$ and $x = 0$
 - (c) $x = y^2 - 2y$ and $x - y - 4 = 0$
 - (d) $y = \sqrt{x}$, $y = x - 4$, and $x = 0$
3. Calculate the volume of the solid obtained by revolving the region bounded by $y = x^2 + 1$, $x = 0$, and $x = 2$ about the line $x = 2$ using the shell method and the disk method. (Note: you should end up with the same answer.)
4. Repeat the previous problem but revolve the region about the line $y = 6$. (Note: You will not be able to get a numerical answer for the shell method, but carry it out as far as you can.)
5. The base of a solid is the region bounded by $y = 1 - x^2$ and $y = 1 - x^4$. Cross sections of the solid that are perpendicular to the x -axis are squares. Find the volume of the solid.
6. Find the lengths of the following curves:
 - (a) $y = \frac{x^4+3}{6x}$ between $x = 1$ and $x = 3$
 - (b) $x = 4 \sin t$, $y = 4 \cos t - 5$ $0 \leq t \leq \pi$
 - (c) $30xy^3 - y^8 = 15$ between $y = 1$ and $y = 3$
7. Find the surface area of the surface generated by revolving the following functions about the x -axis.
 - (a) $y = \frac{x^6+2}{8x^2}$, $1 \leq x \leq 3$
 - (b) $y = \frac{x^3}{3}$, $1 \leq x \leq \sqrt{7}$
 - (c) $x = 1 - t^2$, $y = 2t$, $0 \leq t \leq 1$
8. If the force needed to stretch a spring 0.3 meters from its natural length is 5 Newtons, how much work is done in stretching the spring 2 meters from its natural length?
9. A trough 14 feet long has one rectangular vertical side 14 feet by 3 feet, one rectangular inclined side 14 feet by 5 feet, and two triangular ends with sides 3 feet, 4 feet, and 5 feet. If the trough is filled to the top with water, compute the work done by pumping the water to the rim of the tank.
10. According to Coulomb's Law, two like electrical charges repel each other with a force that is inversely proportional to the square of the distance between them. If the force of repulsion is 10 dynes (1 dyne = 10^{-5} newton) when they are 2 centimeters apart, find the work done in bringing the charges from 5 centimeters apart to 1 centimeter apart.