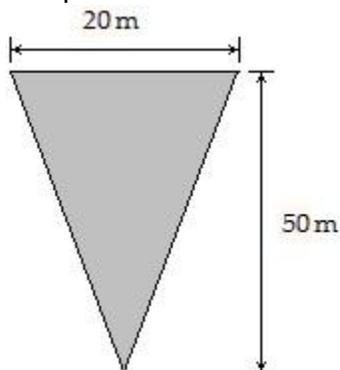


Calculus II
Review for Test 1
Luczak

DO NOT GIVE DECIMAL APPROXIMATIONS.

1. Find the area bounded by the graphs of $y = \sin x$ and $y = \cos x$ on $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$. Sketch the region.
2. Set up the integral(s) needed to find the area of the region between $f(x) = x^3 + x^2 + 1$ and $g(x) = -x^2 + 3x + 1$. Sketch the region.
3. Given $f(y) = y^2 + 4y$ and $g(y) = -2y$. Find the area of the region bounded by $f(y)$ and $g(y)$.
4. Set up but do not evaluate the integrals that would be needed to find the area of the region bounded by $y = 3x$, $y = x$ and $x + y = 4$. Sketch the region.
5. Sketch the region bounded by $y = e^x$, $y = 0$, $x = 0$ and $x = 2$. Set up the integral that could be used to find the volume of the solid generated by revolving this region about the y axis. Indicate the method you are using (i.e. disc or shell method) and include in your sketch a representative rectangle. Do not evaluate the integral.
6. Sketch the region bounded by $y = e^x$, $y = 0$, $x = 0$ and $x = 2$. Find the volume of the solid generated by revolving this region about the x axis. Indicate the method you are using (i.e. disc or shell method) and include in your sketch a representative rectangle.
7. Sketch the region bounded by $y = \sqrt{25 - x^2}$ and $y = 3$. Find the volume of the solid generated by revolving this region about the x axis. Indicate the method you are using (i.e. disc or shell method) and include in your sketch a representative rectangle.
8. Sketch the region bounded by $y = e^{x^2}$, $y = 0$, $x = 1$ and $x = \sqrt{3}$. Find the volume of the solid generated by revolving this region about the y axis. Indicate the method you are using (i.e. disc or shell method) and include in your sketch a representative rectangle.
9. Sketch the region bounded by $y = x^2$ and $y = \sqrt{x}$. Set up the integral that could be used to find the volume of the solid generated by revolving this region about the line $x = 1$. Indicate the method you are using (i.e. disc or shell method) and include in your sketch a representative rectangle. Do not evaluate the integral.

10. Sketch the region bounded by $y = \frac{1}{x^2}$, $y = 1$ and $y = 3$ in the first quadrant. Set up the integral that could be used to find the volume of the solid generated by revolving this region about the line $x = 1$. Indicate the method you are using (i.e. disc or shell method) and include in your sketch a representative rectangle. Do not evaluate the integral.
11. Find the arc length of the curve $y = x^{\frac{3}{2}}$ from $(1,1)$ to $(2, 2\sqrt{2})$.
12. Write the definite integral that represents the arc length of the graph of $f(x) = \frac{2}{3}(x-7)^{\frac{3}{2}}$ over the interval $[7,14]$. Do not evaluate the integral.
13. Find the area of the surface generated by revolving the graph of $x = \sqrt{9-y^2}$ on the interval $-2 \leq y \leq 2$ about the y axis.
14. Write the definite integral that represents the area of the surface formed by revolving the graph of $y = 1-x^2$ on the interval $[0,1]$ about the x axis. Do not evaluate the integral.
15. Write the definite integral that represents the area of the surface formed by revolving the graph of $y = 1-x^2$ on the interval $[0,1]$ about the y axis. Do not evaluate the integral.
16. Find the volume of the solid whose base is bounded by the graphs of $y = x+1$ and $y = x^2 - 1$ where the cross sections are squares taken perpendicular to the x axis.
17. The following figure shows the dimensions of a small dam. Assuming the water level is level with the top of the dam, find the total force on the face of the dam. Round your answer to 2 decimal places.



18. A trapezoidal plate 8 feet wide at the bottom and 4 feet wide at the top is submerged vertically in water such that the bases are parallel to the surface. If the distances from the surface of the water to the lower and upper bases are 10 ft and 6 ft, respectively, find the force exerted by the water on the plate. ($\rho g = 9800$)

19. A spring can be stretched and held 0.5m from its equilibrium position with a force of 45 **N**. Assuming the spring follows Hooke's Law, how much work is done in compressing the spring 1.5m from its equilibrium position?

20. It takes 50 **J** of work to stretch a spring 0.2 m from its equilibrium position. How much work is needed to stretch it an additional 0.5 m?