

Exam #1
Math 274
September 22, 2000

Name _____

§1 Calculation

1. Evaluate $\int \frac{x}{\sqrt{1-4x^2}} dx$.
2. Evaluate $\int x^5 \sqrt{1+x^2} dx$.
3. Evaluate $\int_1^4 \frac{1}{x^2} \sqrt{1+\frac{1}{x}} dx$.

§2 Comprehension

4. Show that $\int_0^1 x^a (1-x)^b dx = \int_0^1 x^b (1-x)^a dx$ for every pair of positive numbers a and b .

§3 Application

5. Find the area of the region bounded by the curves $y = x + 1$, and $y = 9 - x^2$, between the lines $x = -1$ and $x = 2$.
6. Find the area enclosed by the line $y = x - 1$ and the parabola $y^2 = 2x + 6$.
7. Find the volume of the solid obtained by revolving the region bounded by $y = x - x^2$ and $y = 0$ rotated about the line $x = 2$.
8. Find the volume of the solid obtained by revolving the region bounded by $y = \sqrt{x}$ and $y = x$ about the x -axis.
9. A 1600 lb. elevator is suspended by a 200 ft. cable that weighs 10 lb./ft. How much work is needed to raise the elevator from the basement to the third floor, a distance of 30 feet?
10. A tank has the shape of an inverted circular cone with radius 3m and height 15m. If the tank is entirely filled with water, how much work is required to empty the tank by pumping all of the water to the top of the tank? The density of water is 1000 kg/m^3 .

