Review for Final

MATH 2423

Fall 2005

1. Find the area of the region bounded by the curves

   a) $y = 20 - x^2$, $y = x^2 - 12$

   b) $y = 1 - x^2$, $y = 1 - \sqrt{x}$

   c) $x + y = 0$, $x = y^2 + 3y$

2. Find the volume obtained by rotating the region bounded by the given curves about the specified line.

   a) $x = 1 + y^2$, $y = x - 3$ about y-axis

   b) $x = 0$, $x = 9 - y^2$ about $x = -1$

3. Find the volume of a circular cone with height h and base radius r.

4. The base of a solid is a circular disk with radius 3. Find the volume of the solid if parallel cross-sections perpendicular to the base are isosceles right triangles with hypotenuse lying along the base.

5. Find the length of the curve
$$y = \frac{1}{6}(x^2 + 4)^{3/2}, 0 \le x \le 3$$

6. Find the area of the surface obtained by rotating

   a) $9x = y^2 + 18$, $2 \le x \le 6$ about x-axis

   b) $y = x^2$, $0 \le x \le 1$ about x-axis

7. **a)** Find the approximations T_4 and M_4 for the integral $\int_0^2 e^{-x^2} dx$.

   b) Estimate errors in the approximations of part a).

   c) How large do we have to choose n so that T_n and M_n are accurate to within 0.00001?

8. Determine whether the improper integral is convergent or divergent. If convergent find its value.

   a) $\int_1^\infty \frac{1}{(2x+1)^3} dx$

   b) $\int_3^5 \frac{x}{\sqrt{x-3}} dx$

   c) $\int_0^3 \frac{dx}{x^2-x-2} dx$

   d) $\int_1^\infty \frac{arctanx}{x^2} dx$

9. Use the Comparison Theorem to determine whether the integral is convergent or divergent

   a) $\int_0^1 \frac{e^{-x}}{\sqrt{x}} dx$

   b) $\int_1^\infty \frac{1+\cos^2 x}{x+2} dx$