MAT 281 TEST 2

DIRECTIONS: Please be neat and circle all your answers when possible. Show all your work and justify your answers to receive full credit.

NAME_____

1. Solve the differential equation. $(2 + x)y' = 3y$

2. Find particular solution that satisfies the initial condition.

$$y(x + 1) + y' = 0 \qquad y(-2) = 1$$

3. Find the volume of the solid generated by revolving the region bounded by the graphs of equations about the given line.

the line $x = 5$

$$x = y^2, \quad x = 4$$

4. Use the shell method to find the volume of the solid generated by revolving the plane region about the line $x = 4$

$$y = x^2, \quad y = 4x - x^2,$$

5. Find the arc length of the graph of the function over the given interval.

$$y = \frac{3}{2}x^{2/3}, \quad [1, 8]$$

6. Set up and evaluate the indefinite integral for the area of the surface generated by revolving the curve about x-axis.

$$y = \sqrt{4 - x^2}, \quad -1 \le x \le 1$$

7. Seven and one-half foot-pounds of work is required to compress a spring 2 inches from its natural length. Find the work required to compress the spring an additional 3 inches.

8. Consider a 20-foot chain that weighs 3 pounds per foot hanging from a winch 20 feet above ground level. Find the work done by the winch in winding up one-third of the chain.

9. Determine the convergence or divergence of the sequence with the given nth term. If the sequence converges find its limit.

$$a_n = \frac{(n + 1)!}{n!}$$

10. Determine the convergence or divergence of the series. Justify your answer.

$$\sum_{n=1}^{\infty} \frac{n^2}{n^2 + 1}$$

11. Determine the convergence or divergence of the series. Justify your answer.

$$\sum_{n=2}^{\infty} \frac{n}{\ln n}$$

12. Confirm that the Integral Test can be applied to the series. Then use the Integral Test to determine the convergence or divergence of the series .Justify your answer.

$$\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$$

13. Determine the convergence or divergence of the series. Justify your answer.

$$\sum_{n=1}^{\infty} \frac{1}{n^{\pi}}$$

14. Use the Direct Comparison Test to determine the convergence or divergence of the series .Justify your answer.

$$\sum_{n=1}^{\infty} \frac{3^n}{2^n - 1}$$

15. Use the Limit Comparison Test to determine the convergence or divergence of the series. Justify your answer.

$$\sum_{n=0}^{\infty} \frac{1}{\sqrt{n^2 + 1}}$$