Calculus II, Exam 4 Review

Please keep in mind that this is a general review of topics to study. It is not meant to be all-inclusive.

- Chapter 11 -

1. a. Find the linear approximating polynomial for the following function centered at a.

b. Find the quadratic approximating polynomial for the function centered ata.

c. Use the linear and quadratic polynomials to approximate the given quantity.

$$f(x) = 16x^{3/2}, a = 9;\ \ approximate\ 16(9.5)^{3/2}$$

2. a. Find the linear approximating polynomial for the following function centered at a.

b. Find the quadratic approximating polynomial for the function centered ata.

c. Use the linear and quadratic polynomials to approximate the given quantity.

$$f(x) = e^x, a = 0, approximate\ e^{0.8}$$

3. Determine the radius and interval of convergence of

$$\sum_{k=0}^{\infty} (19x)^k$$

4. Determine the radius and interval of convergence of

$$\sum_{k=0}^{\infty} (21kx)^k$$

5. Determine the radius and interval of convergence of

$$\sum_{k=0}^{\infty} sin^k\left(\frac{3}{k}\right)x^k$$

6. Determine the radius and interval of convergence for:

$$x^3 - \frac{x^5}{8} + \frac{x^7}{27} - \frac{x^9}{64} + \cdots$$

7. a. Find the first four nonzero terms fo the Maclaurin series for the given function.

b. Write the power series using summation notation

c. Determine the interval of convergence of the series.

$f(x) = (5 + x^2)^{-1}$

8. a. Find the first four nonzero terms fo the Maclaurin series for the given function.

b. Write the power series using summation notation

c. Determine the interval of convergence of the series.

$f(x) = 9sin3x$

9. Use the definition to find a Maclauren series for f(x)=ln(1+x), Use that series to find a Maclauren series for g(x)=ln(1+10x)

- Chapter 12 -

10. Find a set of parametric equations for the parabola $y = x^2$

11. Find parametric equations for the following curve. Include an interval for the parameter values. A circle centered at (-4, -5) with radius 7, generated counterclockwise.

12. Find a parametric description of the line segment from the point P to the point Q. P(0,0), Q (7, -13).

13. Find parametric equations for the following curve. Include an interval for the parameter values.

The path consisting of the line segment from (-2, -7) to (0, -9), followed by the segment of the parabola $y = -9 + x^2$ from (0,0) to (3,0) using parameter values $-2 \leq t \leq 3$

14. Consider the following parametric equations, x= − 5t. y = 9t−11,

$-10 \leq t \leq 10$

a. Make a brief table of values for t, x, and y

b. Plot the points and complete the curve indicating positive orientation with arrows

a. Eliminate the parameter to obtain an equation in x and y
b. Describe the curve

15. Consider the parametric equations. $x = \sqrt{t} + 6, y = 5\sqrt{t}\,; 0 \leq t \leq 16$

a. Eliminate the parameter to obtain an equation in x and y

b. Describe the curve and indicated positive orientation.

16. Consider the parametric equations.

$x = 13cost, y = 1 + 13sint; 0 \leq t \leq 2\pi$

a. Eliminate the parameter to obtain an equation in x and y

b. Describe the curve and indicated positive orientation.

17. The polar coordinates of a point are given. Find the rectangular coordinates of the point. $(1, \frac{5\pi}{4})$

18. Express the Cartesian coordinates $(2, 2\sqrt{3})$ in polar coordinates in at least two different ways, one with the angle between 0 and 2π, the other with the angle between 0 and -2π

19. Find the slope of the line tangent to the polar curve at the given point.

$r = 9sin\theta; (\frac{-9}{2}, \frac{11\pi}{6})$

20. Make a sketch of the region and its bounding curves. Find the area of the region. The region inside the limacon $r = 2 + cos\theta$ (Give an exact answer for the area)

21. Make a sketch of the region and its bounding curves. Find the area of the region.

The region inside one leaf of $r = 2cos5\theta$

22. Find the area of the following region.

The region outside the circle r=3 and inside the circle $r = -6sin\theta$

23. find the area of the following region.

The region common to the circles $r = -4cos\theta \; and \; r = 2$

24. Find the area of the following region.

The region common to the circle r=8 and the cardioid $r = 8(1 - cos\theta)$

25. Determine the coordinates of the focus and the equation of the directrix then graph the equation $x^2 = -25y$

26. Sketch the graph of the parabola $y^2 = 16x$. Specify the location of the focus and the equation of the directrix.

27. Sketch the graph of the following ellipse. Plot the coordinates of the vertices and foci, and find the lengths of the major and minor axes. $\frac{x^2}{36} + y^2 = 1$

28. Sketch the graph of the following hyperbola. Specify the coordinates of the vertices and foci, and find the equations of the asymptotes. $\frac{y^2}{25} - \frac{x^2}{4} = 1$

29. Find the focus and directrix of the parabola with the equation $9x^2 + 10y = 0$. *Then graph the parabola*

30. Sketch the graph of the following ellipse. Plot the coordinates of the vertices and foci, and find the lengths of the major and minor axes. $\frac{x^2}{4} + \frac{y^2}{9} = 1$

31. Sketch the graph of the following hyperbola. Specify the coordinates of the vertices and foci and find the equations of the asymptotes.

$\frac{x^2}{5} - \frac{y^2}{3} = 1$