AP Calculus BC   Name: ______________________________

9.4 Worksheet   Period: ___________

Plot the (r, θ) polar coordinate and find the corresponding rectangular (x, y) coordinate.

1. $\left(8, \frac{\pi}{2}\right)$

2. $\left(-2, \frac{5\pi}{3}\right)$

3. $\left(7, \frac{5\pi}{4}\right)$

4. $\left(-2, \frac{11\pi}{6}\right)$

The rectangular (x, y) coordinate is given. Plot the coordinate, then find two sets of polar coordinates in $0 \leq \theta \leq 2\pi$.

5. (2, 2)

6. (0, -6)

7. (-3, 4)

8. (3, -2)

Covert the rectangular equation to polar form and sketch its graph.

9. $x^2 + y^2 = 9$

10. $x^2 - y^2 = 9$

11. $x^2 + y^2 = a^2$

12. $x^2 - y^2 = a^2$

13. $y = 8$

14. $x = 12$

15. $3x - y + 2 = 0$

16. $xy = 4$

17. $y^2 = 9x$

18. $(x^2 + y^2)^2 - 9(x^2 - y^2) = 0$

Covert the polar equation to rectangular form and sketch its graph.

19. $r = 4$

20. $r = -5$

21. $r = 3\sin(\theta)$

22. $r = 5\cos(\theta)$

23. $r = \theta$

24. $\theta = \frac{5\pi}{6}$

Find the points of vertical and horizontal tangency (if any) to the polar curve.

25. $r = 1 - \sin(\theta)$

Sketch a graph of the polar equation by hand.

26. $r = 1 + \sin(\theta)$

27. $r = 4(1 + \cos(\theta)$

AP Calculus BC   Name: ___________________________________

9.5 Worksheet   Period: _____________

Write an integral that represents the area of the entire enclosed figure.

1. $r = 4\sin(\theta)$

2. $r = \cos(2\theta)$

Find the area of the region.

3. Interior of $r = 6\sin(\theta)$

4. Interior of $r = 3\cos(\theta)$

5. One petal of $r = \sin(2\theta)$

6. One petal of $r = \cos(5\theta)$

Graph the polar equation on a calculator, then find the area analytically.

7. Inner loop of $r = 1 + 2\cos(\theta)$

8. Inner loop of $r = 2 - 4\cos(\theta)$

Find the points of intersection of the graphs of the equations.

9. $r = 1 + \cos(\theta)$

$r = 1 - \cos(\theta)$

10. $r = 3(1 + \sin(\theta))$

$r = 3(1 - \sin(\theta))$

11. $r = 4 - 5\sin(\theta)$

$r = 3\sin(\theta)$

12. $r = 3 + \sin(\theta)$

$r = 2\csc(\theta)$

Use a calculator to graph, then find the area analytically.

13. Common interior of $r = 3 - 2\sin(\theta)$ and $r = -3 + 2\sin(\theta)$.

14. Common interior of $r = 4\sin(\theta)$ and $r = 2$.

15. Inside $r = 2\cos(\theta)$ and outside $r = 1$.

Use your graphing calculator to graph and find the arc length.

16. $r = 2\theta,\ 0 \le \theta \le 2\pi$

17. $r = \sin(3\cos(\theta)),\quad 0 \le \theta \le \pi$

Calculus 2

Unit 9 Part 2 REVIEW

Convert the equation to polar form and sketch the curve:

#1. $9x^2 + 9y^2 = 18y$

#2. $y = 3$

#3. $y = x^2$

Convert the equation to rectangular form and sketch the curve:

#4. $r = 3$

#5. $r + 6\cos\theta - 2\sin\theta = \dfrac{6}{r}$

#6. $r = 8\sin\theta$

#7. $r = \cot\theta\csc\theta$

#8. $\theta = \dfrac{\pi}{3}$

Graph the polar equation curve and find an interval for which the graph is traced only once:

#9. $r = 4 - 3\cos\theta$

#10. $r = 5$

#11. $r = 4\cos(3\theta)$

For which values of θ do the following curves intersect?

#12. $r = 5 + 4\sin\theta, \quad r = 3$

#13. $r = 4\cos\theta, \quad r = 8\cos\theta$

#14. $r = 5(1 - \cos\theta), \quad r = 5(1 + \cos\theta)$

#15. $r = -4\sin\theta, \quad r = 2$

Find the area described:

#16. One petal of $r = 4\sin(2\theta)$

#17. The inner loop of $r = 2 - 4\cos\theta$

#18. The area within both polar curves: $r = 5 + 4\sin\theta, \quad r = 3$

#19. The area between the polar curves: $r = 5 + 4\sin\theta, \quad r = 3$

#20. The area between the polar curves and below the x-axis: $r = 4\cos\theta, \quad r = 8\cos\theta$

Find the arc length of the curve:

#21. The part of the cardioid $r = 3 - 3\cos\theta$ which is below the x-axis.

#22. One time around the entire curve of $r = 4\sin(3\theta)$.