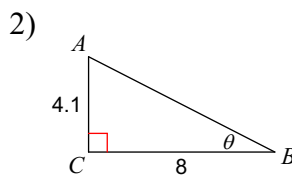


Practice Final

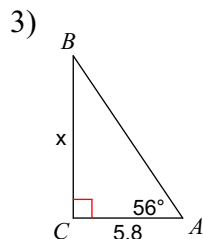
Find the value of the trig function indicated.

1) Find  $\sin \theta$  if  $\cot \theta = \frac{2\sqrt{14}}{5}$

Find the measure of each angle indicated.  
Round to the nearest tenth.

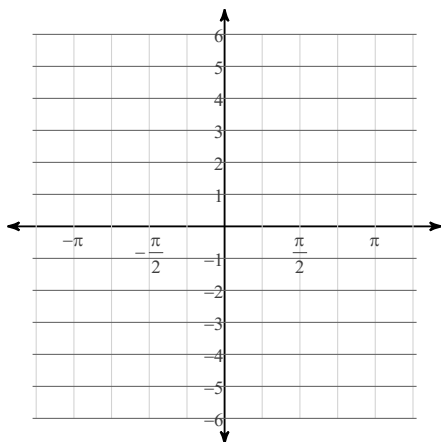


Find the measure of each side indicated.  
Round to the nearest tenth.

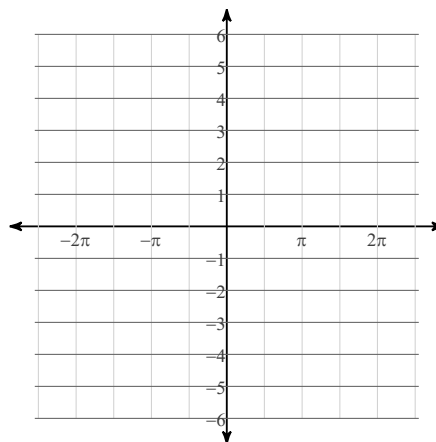


Graph each function using radians.

4)  $y = 2 + \frac{1}{2} \cdot \cos 3\theta$



5)  $y = 3 \tan \frac{\theta}{3} + 2$



Solve each equation for  $0 \leq \theta < 2\pi$ .

6)  $3 \cos \theta = 6$

7)  $4 + \frac{10}{3} \cdot \sin \theta = 4 + 3 \sin \theta$

Find the exact value of each expression.

8)  $\csc \cos^{-1} \frac{4\sqrt{14}}{15}$

Verify each identity.

9)  $\frac{\tan x}{\sin x} = \frac{1}{\cos x}$

Solve each equation for  $0 \leq \theta < 2\pi$ .

10)  $2\cos^2 \theta = 1$

11)  $-\sqrt{3}\cos \theta + \cos \theta \tan \theta + 3\cos \theta = 3\cos \theta$

Find the exact value of each.

12)  $\cos \frac{5\pi}{12}$

Simplify.

13)  $\sin -6u \cos -u - \cos -6u \sin -u$

Find the exact value of each.

14)  $\tan \theta = -\frac{\sqrt{2}}{2}$  where  $630 \leq \theta < 720$

Find  $\tan \frac{\theta}{2}$

Find each measurement indicated. Round your answers to the nearest tenth.

15)  $m\angle A = 87^\circ$ ,  $c = 6$  mi,  $a = 9$  mi  
Find  $m\angle C$

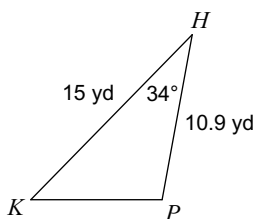
16)  $m\angle B = 143^\circ$ ,  $m\angle A = 11^\circ$ ,  $a = 14$  km  
Find  $b$

17)  $b = 24$  km,  $m\angle A = 34^\circ$ ,  $c = 11$  km  
Find  $a$

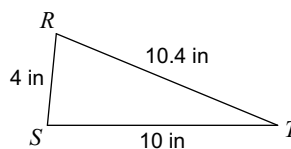
18)  $c = 15$  km,  $m\angle A = 136^\circ$ ,  $b = 17$  km  
Find  $m\angle B$

Find the area of each triangle to the nearest tenth.

19)



20)



**Simplify. Write your answer in polar form.**

$$21) 6\left(\cos \frac{\pi}{2} + i\sin \frac{\pi}{2}\right) \cdot 3\sqrt{2}\left(\cos \frac{4\pi}{3} + i\sin \frac{4\pi}{3}\right)$$

**Find the component form and magnitude for the vector.**

$$23) \overrightarrow{PQ} \text{ where } P = (5, 8) \quad Q = (7, 7)$$

**Find the dot product of the given vectors.**

$$25) \mathbf{u} = \langle 8, 9 \rangle \\ \mathbf{v} = \langle 4, -6 \rangle$$

**Simplify. Write "undefined" for expressions that are undefined.**

$$27) \begin{bmatrix} -2 & 6 & 6 \end{bmatrix} + \begin{bmatrix} -4 & 5 & 3 \end{bmatrix}$$

**Evaluate each determinant.**

$$29) \begin{vmatrix} 1 & 2 \\ 3 & -3 \end{vmatrix}$$

**Find the partial fraction decomposition of each.**

$$31) \frac{2x^2 + 14x + 28}{x^2 + 6x + 9}$$

**Solve for the system of equations.**

$$32) \begin{cases} 6x + 4y = -16 \\ -x - 6y = 1 \end{cases}$$

**Simplify. Write your answer in rectangular form when rectangular form is given and in polar form when polar form is given.**

$$22) (4(\cos 225 + i\sin 225))^5$$

**Express the resultant vector as a linear combination of unit vectors  $\mathbf{i}$  and  $\mathbf{j}$ .**

$$24) \mathbf{u} = 6\mathbf{i} - \mathbf{j} \\ \mathbf{v} = -6\mathbf{i} + 2\mathbf{j} \\ \text{Find: } 3\mathbf{u} - 5\mathbf{v}$$

**Find the measure of the angle between the two vectors.**

$$26) \mathbf{u} = \langle 6, 2 \rangle \\ \mathbf{v} = \langle 6, -6 \rangle$$

$$28) \begin{bmatrix} 2 & 2 & 4 \\ 6 & -4 & 5 \end{bmatrix} \cdot \begin{bmatrix} -6 & -5 \\ -4 & -1 \\ -4 & -5 \end{bmatrix}$$

**Find the inverse of each matrix.**

$$30) \begin{bmatrix} 0 & 1 \\ 0 & 2 \end{bmatrix}$$

$$33) \begin{cases} -3x + 4y = -10 \\ -6x - 4y = -4 \end{cases}$$

$$34) \begin{aligned} -3x - 5y &= -14 \\ x - y &= -6 \end{aligned}$$

$$35) \begin{aligned} -6x + 2y - z &= 11 \\ x - y - 4z &= 23 \\ -6x - z &= 23 \end{aligned}$$

**Find the number of possible outcomes in the sample space.**

- 36) A basketball player attempts six free throws. Each attempt results in a score or a miss.

**Find the number of possibilities in each scenario.**

- 38) You are setting the combination on a five-digit lock. You want to use the numbers 10962 but don't care what order they are in.

**Find each term described.**

- 40) 5th term in expansion of  $(4x + 1)^4$

**Find the missing probability.**

$$42) P(B) = \frac{1}{2} \quad P(A \text{ and } B) = \frac{6}{25} \quad P(A|B) = ?$$

**Events  $A$  and  $B$  are mutually exclusive. Find the missing probability.**

$$44) P(B) = \frac{7}{20} \quad P(A \text{ or } B) = \frac{4}{5} \quad P(A) = ?$$

**Find the number of unique permutations of the letters in each word.**

- 37) STEAM

**Expand completely.**

$$39) (3y^2 - x^2)^4$$

**Find the probability.**

- 41) A cooler contains twelve bottles of sports drink: four lemon-lime flavored, three orange flavored, and five fruit-punch flavored. You randomly grab a bottle. Then you return the bottle to the cooler, mix up the bottles, and randomly select another bottle. Both times you get a lemon-lime drink.

**Find the probability.**

- 43) A jar contains four blue marbles numbered one to four. The jar also contains four red marbles numbered one to four. You randomly pick a marble. It is blue or has a number greater than three.

**Find the probability of each event.**

- 45) A gambler places a bet on a horse race. To win, he must pick the top three finishers in any order. Seven horses of equal ability are entered in the race. Assuming the horses finish in a random order, what is the probability that the gambler will win his bet?

**Find the explicit formula.**

- 47)  $-31, -24, -17, -10, \dots$

**Find the explicit formula.**

- 49)  $2, -8, 32, -128, \dots$

**Evaluate each arithmetic series described.**

- 51)  $a_1 = 26, a_n = 152, n = 15$

**Evaluate each infinite geometric series described.**

- 53)  $3 + 12 + 48 + 192 \dots$

**Find the next three terms in each sequence.**

- 46)  $-1, -2, -6, -24, -120, \dots$

**Given two terms in an arithmetic sequence find the term named in the problem.**

- 48)  $a_{15} = 64$  and  $a_{33} = 172$   
Find  $a_{30}$

**Given two terms in a geometric sequence find the term named in the problem.**

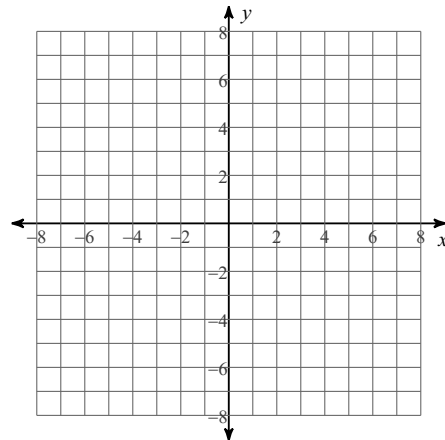
- 50)  $a_5 = -324$  and  $a_4 = -108$   
Find  $a_{10}$

**Evaluate each geometric series described.**

- 52)  $a_1 = -4, r = 5, n = 7$

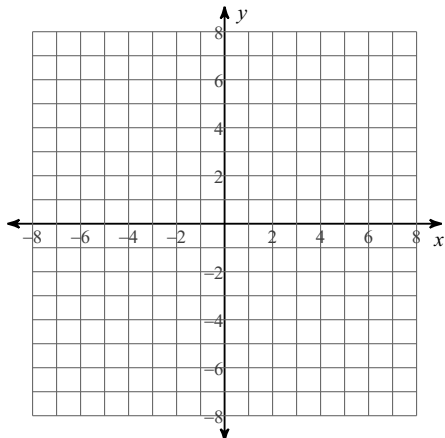
**Identify the vertex and focus of each. Then sketch the graph.**

- 54)  $y^2 + x + 12y + 38 = 0$



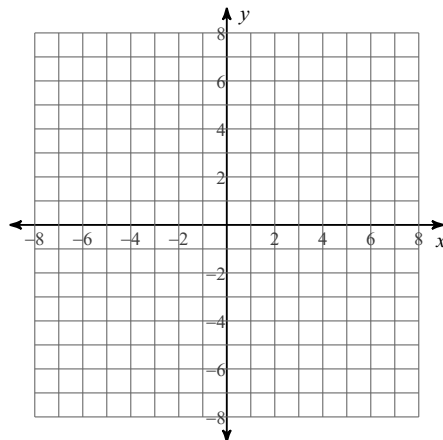
Identify the center and radius of each. Then sketch the graph.

$$55) x^2 + y^2 - 6x - 2y\sqrt{6} - 1 = 0$$



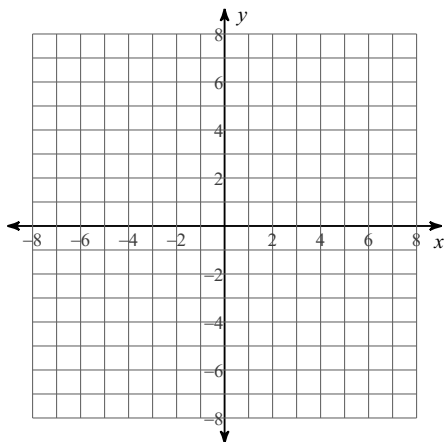
Identify the center, vertices, and foci of each. Then sketch the graph.

$$56) 4x^2 + 392y = -49y^2 - 588$$



Identify the vertices and foci of each. Then sketch the graph.

$$57) (x - 3)^2 - \frac{(y + 3)^2}{4} = 1$$



Use the information provided to write the general conic form equation of each parabola.

$$58) \text{Vertex: } (5, -7), \text{Focus: } \left(5, -\frac{27}{4}\right)$$

Use the information provided to write the general conic form equation of each circle.

$$59) \text{Center: } (-13, 6) \\ \text{Radius: } 4$$

Use the information provided to write the general conic form equation of each ellipse.

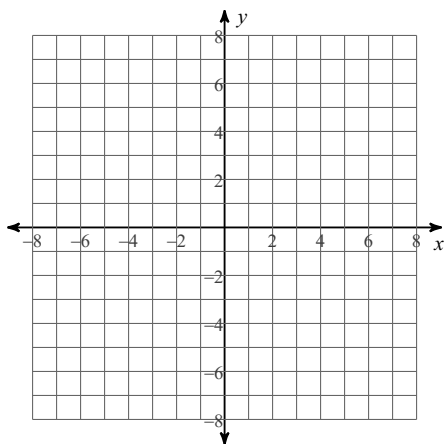
$$60) \text{Vertices: } (-2, -9 + \sqrt{55}), (-2, -9 - \sqrt{55}) \\ \text{Foci: } (-2, -9 + 2\sqrt{10}), (-2, -9 - 2\sqrt{10})$$

Use the information provided to write the general conic form equation of each hyperbola.

- 61) Vertices:  $(4, 2), (-2, 2)$   
 Foci:  $(6, 2), (-4, 2)$

Sketch the curve for each pair of parametric equations.

- 63)  $x = 4\cos t - 1, y = 2\sin t + 2$

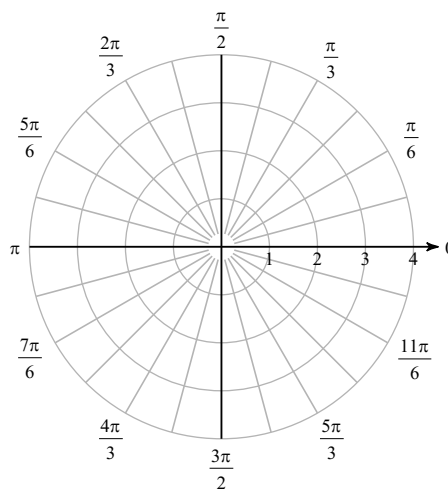


Write each pair of parametric equations in rectangular form.

- 62)  $x = t, y = \frac{t^2}{5} + \frac{2t}{5} - \frac{9}{5}$

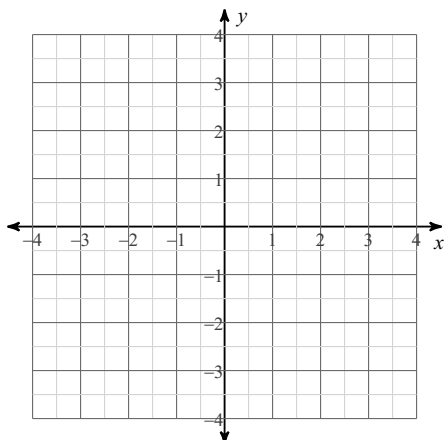
Plot the point with the given polar coordinates.

- 64)  $\left(3, \frac{4\pi}{3}\right)$



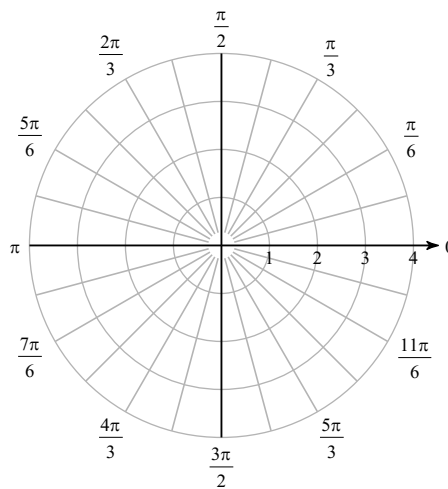
Convert each pair of polar coordinates to rectangular coordinates.

- 65)  $\left(1, \frac{\pi}{4}\right)$



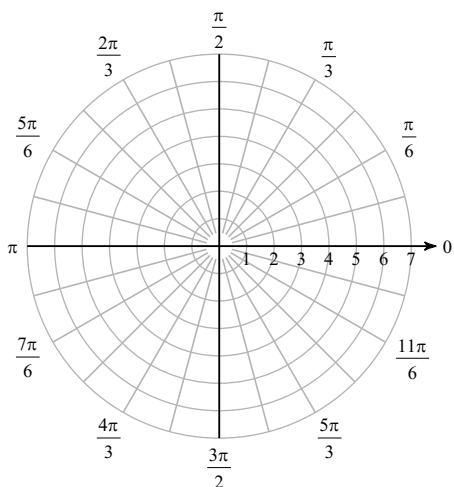
Convert each pair of rectangular coordinates to polar coordinates where  $r > 0$  and  $0 \leq \theta < 2\pi$ .

- 66)  $(1, \sqrt{3})$



Consider each polar equation. Classify the curve; and sketch the graph.

67)  $r = 3 - 3\sin \theta$



Convert each equation from rectangular to polar form.

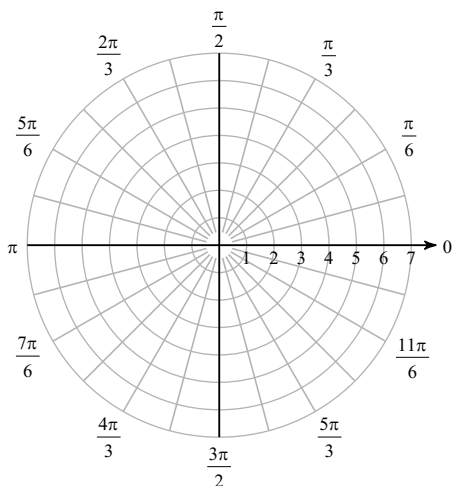
68)  $x = \frac{y^2}{2}$

Convert each equation from polar to rectangular form.

69)  $r = 2\cot \theta \csc \theta$

Each polar equation describes a conic section with a focus at the origin. Graph the polar equation.

70)  $r = \frac{10}{5 + 5\sin \theta}$





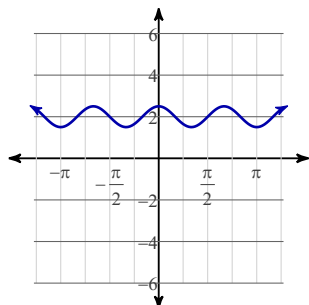
# Answers to Practice Final (ID: 1)

1)  $\frac{5}{9}$

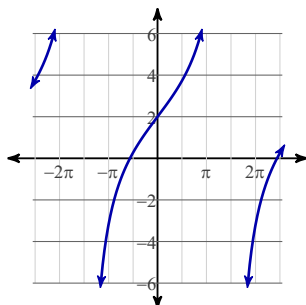
2)  $27.1^\circ$

3) 8.6

4)



5)



6) No solution.

7)  $\{0, \pi\}$

8) 15

9)  $\frac{\tan x}{\sin x}$

Use  $\tan x = \frac{\sin x}{\cos x}$

$$\frac{\sin x}{\sin x \cos x}$$

Cancel common factors

$$\frac{1}{\cos x}$$

■

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

11)  $\left\{\frac{\pi}{3}, \frac{4\pi}{3}\right\}$

12)  $\frac{\sqrt{6} - \sqrt{2}}{4}$

13)  $\sin -5u$

14)  $-\sqrt{5} - 2\sqrt{6}$

15)  $41.7^\circ$

16) 44.2 km

17) 16.1 km

18)  $23.5^\circ$

19) 45.7 yd<sup>2</sup>

20) 19.9 in<sup>2</sup>

21)  $18\sqrt{2}\left(\cos \frac{11\pi}{6} + i\sin \frac{11\pi}{6}\right)$

22)  $1024(\cos 1125 + i\sin 1125)$

23)  $\langle 2, -1 \rangle$

$\sqrt{5} \approx 2.236$

24)  $48\mathbf{i} - 13\mathbf{j}$

25) -22

26)  $63.43^\circ$

27)  $\begin{bmatrix} -6 & 11 & 9 \end{bmatrix}$

28)  $\begin{bmatrix} -36 & -32 \\ -40 & -51 \end{bmatrix}$

29) -9

30) No inverse exists

31)  $2 + \frac{2}{x+3} + \frac{4}{(x+3)^2}$

32)  $\left(-\frac{23}{8}, \frac{5}{16}\right)$

33)  $\left(\frac{14}{9}, -\frac{4}{3}\right)$

34) (-2, 4)

35) (-3, -6, -5)

36) 64

37) 120

38) 120

39)  $81y^8 - 108y^6x^2 + 54y^4x^4 - 12y^2x^6 + x^8$

40) 1

41)  $\frac{1}{9} \approx 0.111$

42)  $\frac{12}{25}$

43)  $\frac{5}{8} = 0.625$

44)  $\frac{9}{20}$

45) 2.857%

46) -720, -5040, -40320

47)  $a_n = -38 + 7n$

48)  $a_{30} = 154$

49)  $a_n = 2 \cdot (-4)^{n-1}$

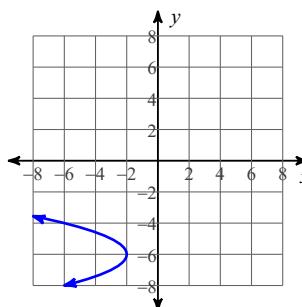
50)  $a_{10} = -78732$

51) 1335

52) -78124

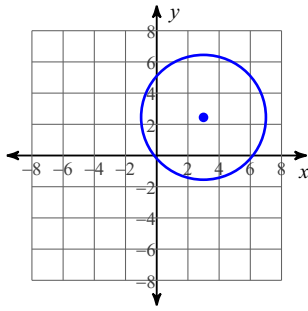
53) No sum

54)



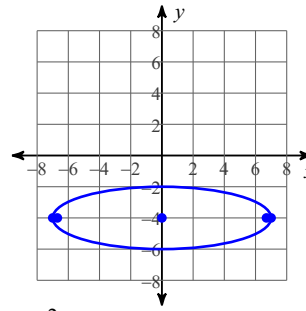
Vertex:  $(-2, -6)$   
Focus:  $\left(-\frac{9}{4}, -6\right)$

55)



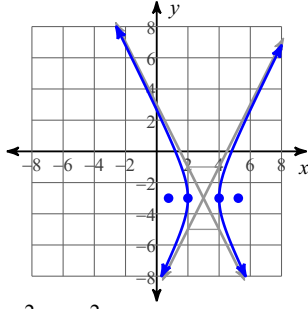
Center:  $(3, \sqrt{6})$   
Radius: 4

56)



Center:  $(0, -4)$   
Vertices:  $(7, -4)$   
 $(-7, -4)$   
Foci:  $(3\sqrt{5}, -4)$   
 $(-3\sqrt{5}, -4)$

57)



Vertices:  $(4, -3)$   
 $(2, -3)$   
Foci:  $(3 + \sqrt{5}, -3)$   
 $(3 - \sqrt{5}, -3)$

58)  $-x^2 + 10x + y - 18 = 0$

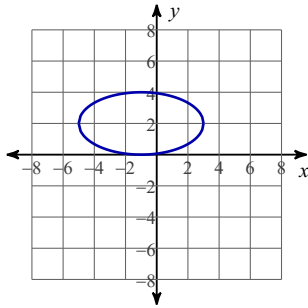
59)  $x^2 + y^2 + 26x - 12y + 189 = 0$

61)  $16x^2 - 9y^2 - 32x + 36y - 164 = 0$

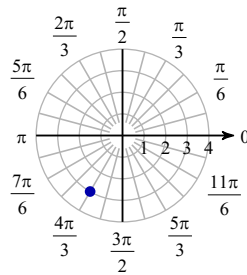
60)  $11x^2 + 3y^2 + 44x + 54y + 122 = 0$

62)  $y = \frac{x^2}{5} + \frac{2x}{5} - \frac{9}{5}$

63)



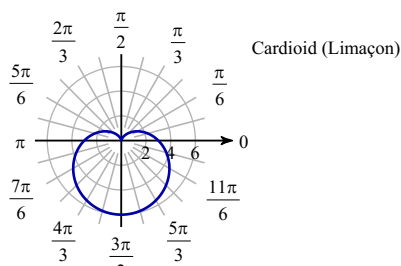
64)



65)  $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

66)  $\left(2, \frac{\pi}{3}\right)$

67)



68)  $r = 2\cot \theta \csc \theta$

69)  $x = \frac{y^2}{2}$

70)

