

Final Exam Review

Date _____ Period _____

Use identities to find the value of each expression.

1) If $\sin\left(\theta - \frac{\pi}{2}\right) = 0.52$, find $\cos \theta$.

2) If $\sin(-\theta) = 0.16$, find $\cos\left(\theta - \frac{\pi}{2}\right)$.

3) Find $\csc \theta$ and $\tan \theta$
if $\cot \theta = \frac{9}{5}$ and $\sec \theta > 0$.

4) Find $\tan \theta$ and $\sec \theta$
if $\sin \theta = \frac{3}{4}$ and $\cot \theta > 0$.

Verify each identity.

5) $\sec^2 x + \cot^2 x = \tan^2 x + \csc^2 x$

6) $\frac{\csc^2 x}{\tan^2 x} = \frac{\cot^2 x}{\sin^2 x}$

7) $\sec x + \cos x = \frac{\cos^2 x + 1}{\cos x}$

$$8) \frac{\cot^2 x}{\sin x} = \frac{\csc x}{\tan^2 x}$$

$$9) \frac{\cot x}{\sec^2 x} = \frac{\cos^3 x}{\sin x}$$

$$10) \frac{\tan x}{\sec^3 x} = \cos^2 x \sin x$$

$$11) 2\cos^2 x(1 - \cos 2x) = \sin^2 2x$$

$$12) 2\sin^2 x \cos x = \frac{\sin 2x}{\csc x}$$

$$13) \frac{\cos x}{\tan 2x} = \frac{\cos 2x}{2\sin x}$$

$$14) \tan x + \sec^2 x = \frac{2(\sin x \cos x + 1)}{1 + \cos 2x}$$

Use the half-angle identities to find the exact value of each.

$$15) \cos 22.5^\circ$$

$$16) \sin 67.5^\circ$$

Find the exact value of each.

$$17) \tan \theta = -\frac{4}{3} \text{ where } \frac{7\pi}{2} \leq \theta < 4\pi$$

$$\text{Find } \sin \frac{\theta}{2}$$

$$18) \cos \theta = \frac{4}{5} \text{ where } 0 \leq \theta < \frac{\pi}{2}$$

$$\text{Find } \sin \frac{\theta}{2}$$

Find the exact value of each expression.

$$19) \tan^{-1} 0$$

$$20) \tan^{-1} \frac{\sqrt{3}}{3}$$

$$21) \tan^{-1} \sqrt{3}$$

$$22) \tan^{-1} -\frac{\sqrt{3}}{3}$$

$$23) \cos^{-1} 0$$

$$24) \cos^{-1} \frac{1}{2}$$

$$25) \tan^{-1} 1$$

$$26) \cos^{-1} \frac{\sqrt{2}}{2}$$

$$27) \sin^{-1} \frac{\sqrt{3}}{2}$$

$$28) \cos^{-1} 1$$

$$29) \cos^{-1} \frac{\sqrt{3}}{2}$$

$$30) \sin^{-1} 1$$

$$31) \cot \sin^{-1} \frac{3\sqrt{34}}{34}$$

$$32) \tan^{-1} \left(\cos \frac{\pi}{2} \right)$$

$$33) \csc \sin^{-1} \frac{\sqrt{57}}{11}$$

$$34) \sin^{-1} \left(\cot \frac{3\pi}{4} \right)$$

$$35) \cos^{-1} \left(\cot \frac{\pi}{4} \right)$$

$$36) \tan \sin^{-1} \frac{6\sqrt{2}}{11}$$

$$37) \cos^{-1} (\sec 0)$$

$$38) \sin \cos^{-1} \frac{3\sqrt{11}}{11}$$

$$39) \sin^{-1} (\tan 0)$$

$$40) \csc \sin^{-1} \frac{\sqrt{13}}{7}$$

41) $\tan^{-1}(\sec \pi)$

42) $\sec \sin^{-1} \frac{4}{5}$

Write each trigonometric expression as an algebraic expression.

43) $\cot \cos^{-1} x$

44) $\csc \sin^{-1} x$

45) $\sin \cos^{-1} x$

46) $\csc \tan^{-1} x$

47) $\cot \sin^{-1} x$

48) $\sec \sin^{-1} x$

Find the exact value of each.

49) $\sin \frac{2\pi}{9} \cos \frac{\pi}{18} - \cos \frac{2\pi}{9} \sin \frac{\pi}{18}$

50) $\frac{\tan \frac{43\pi}{18} - \tan \frac{5\pi}{9}}{1 + \tan \frac{43\pi}{18} \tan \frac{5\pi}{9}}$

51) $\sin 159 \cos 24 - \cos 159 \sin 24$

52) $\sin 104 \cos 46 + \cos 104 \sin 46$

Simplify.

53) $\cos 2\theta \cos -\theta + \sin 2\theta \sin -\theta$

54) $\frac{\tan 5\theta + \tan -6\theta}{1 - \tan 5\theta \tan -6\theta}$

55) $\cos 5v \cos 6v - \sin 5v \sin 6v$

56) $\frac{\tan -2x - \tan 6x}{1 + \tan -2x \tan 6x}$

Write each trigonometric expression as an algebraic expression.

57) $\cos(\tan^{-1} x + \tan^{-1} 0)$

58) $\tan\left(\tan^{-1} x - \sin^{-1} \frac{\sqrt{2}}{2}\right)$

Verify each identity.

59) $\sin\left(\theta - \frac{3\pi}{2}\right) = \cos \theta$

60) $\sin\left(\frac{\pi}{2} + \theta\right) = \cos \theta$

State the number of possible triangles that can be formed using the given measurements.

61) In $\triangle ZXY$, $m\angle Z = 63^\circ$, $y = 30$, $z = 6$

62) In $\triangle TRS$, $m\angle T = 138^\circ$, $s = 26$, $t = 20$

63) In $\triangle HPK$, $m\angle H = 66^\circ$, $k = 28$, $h = 8$

64) In $\triangle FDE$, $m\angle E = 55^\circ$, $e = 21$, $d = 4$

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

65) In $\triangle DEF$, $m\angle D = 151^\circ$, $m\angle E = 9^\circ$, $d = 34$
Find e

66) In $\triangle BCA$, $m\angle B = 57^\circ$, $a = 22$, $b = 5$
Find c

67) In $\triangle DEF$, $m\angle D = 31^\circ$, $f = 27$, $d = 20$
Find e

68) In $\triangle STR$, $m\angle T = 36^\circ$, $m\angle R = 30^\circ$, $s = 42$
Find r

69) In $\triangle KHP$, $m\angle K = 139^\circ$, $p = 23$, $k = 27$
Find $m\angle P$

70) In $\triangle ZXY$, $m\angle Y = 89^\circ$, $y = 16$, $x = 8$
Find $m\angle X$

71) In $\triangle ABC$, $m\angle C = 73^\circ$, $c = 20$, $b = 14$
Find $m\angle B$

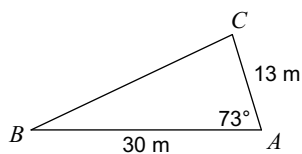
72) In $\triangle BCA$, $m\angle B = 16^\circ$, $a = 29$, $b = 8$
Find $m\angle C$

Solve each triangle. Round your answers to the nearest tenth.

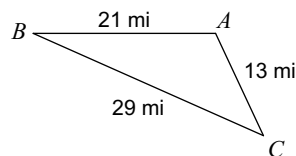
73) In $\triangle YZX$, $m\angle Y = 75^\circ$, $x = 21$, $y = 8$

74) In $\triangle STR$, $m\angle S = 137^\circ$, $m\angle R = 23^\circ$, $r = 8$

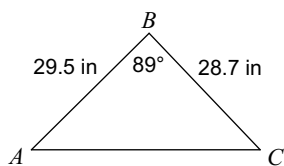
75)



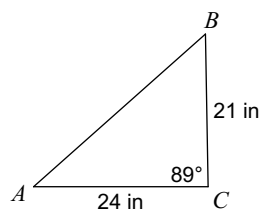
76)



77)



78)



79) $a = 24$ mi, $b = 15$ mi, $m\angle C = 107^\circ$

80) $a = 21$ in, $b = 23$ in, $c = 8$ in

81) $a = 28$ km, $c = 18$ km, $b = 12$ km

82) $b = 24.5$ m, $c = 25.8$ m, $a = 23.4$ m

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

83) $c = 16.6$ in, $b = 20.1$ in, $m\angle A = 119.1^\circ$
Find a

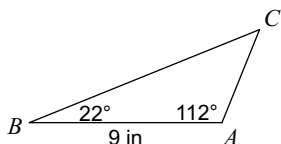
84) $m\angle C = 128^\circ$, $a = 28$ mi, $b = 19$ mi
Find c

85) $c = 10$ yd, $b = 17$ yd, $m\angle A = 25^\circ$
Find a

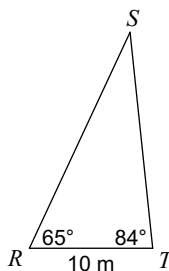
86) $b = 15$ in, $m\angle A = 31^\circ$, $c = 28$ in
Find a

Find the area of each triangle to the nearest tenth.

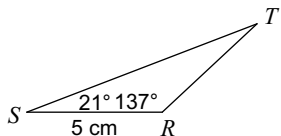
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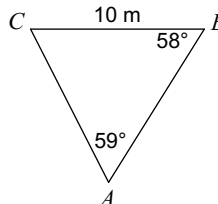
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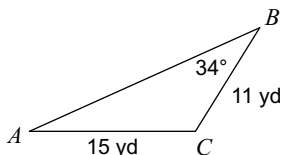
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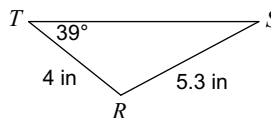
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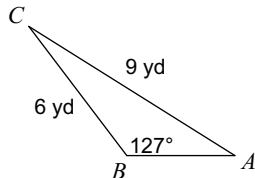
91)



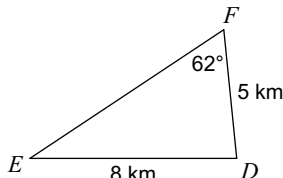
92)



93)



94)



Find the component form of the resultant vector.

95) $\mathbf{u} = \langle 2, 4 \rangle$
 $\mathbf{g} = \langle 0, 4 \rangle$
 Find: $\mathbf{u} - \mathbf{g}$

96) $\mathbf{u} = \langle -4, -10 \rangle$
 Find the vector opposite \mathbf{u}

97) $\mathbf{f} = \langle -2, -5 \rangle$
 Find: $-4\mathbf{f}$

98) Given: $T = (9, 0)$ $X = (-1, -4)$
 $Y = (-1, 0)$ $Z = (-7, 4)$
 Find: $\overrightarrow{TX} + 4\overrightarrow{YZ}$

99) Given: $A = (5, -5)$ $B = (7, 3)$
Find: $7\overrightarrow{AB}$

100) Given: $A = (-3, 0)$ $B = (-9, -10)$
Find the vector opposite \overrightarrow{AB}

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

101) Given: $A = (-5, -7)$ $B = (0, 4)$
 $C = (3, 8)$ $D = (8, -6)$
Find: $7\overrightarrow{AB} - 9\overrightarrow{CD}$

102) $\mathbf{u} = -5\mathbf{i} + 7\mathbf{j}$
Find the vector opposite \mathbf{u}

103) $\mathbf{f} = -8\mathbf{i} + 2\mathbf{j}$
Find the vector opposite \mathbf{f}

104) $\mathbf{f} = -8\mathbf{i} - 8\mathbf{j}$
Unit vector in the opposite direction of \mathbf{f}

105) $\mathbf{f} = 30\mathbf{i} - \sqrt{1309}\mathbf{j}$
Find the vector opposite \mathbf{f}

106) Given: $A = (9, 7)$ $B = (2, -10)$
Find: $\sqrt{3} \cdot \overrightarrow{AB}$

107) $\mathbf{u} = -6\mathbf{i} + 2\mathbf{j}$
Unit vector in the direction of \mathbf{u}

Find the component form of the resultant vector.

108) $\mathbf{u} = \langle 1, 3\sqrt{2} \rangle$
Unit vector in the direction of \mathbf{u}

Find the magnitude and direction angle of the resultant vector.

109) $\mathbf{f} = \langle -4, -12 \rangle$
Unit vector in the direction of \mathbf{f}

110) $\mathbf{u} = \langle -9, 40 \rangle$
Unit vector in the direction of \mathbf{u}

111) $\mathbf{u} = \langle -12, 11 \rangle$
Unit vector in the opposite direction of \mathbf{u}

112) $\mathbf{a} = \langle 15, 36 \rangle$
Unit vector in the opposite direction of \mathbf{a}

113) $\mathbf{f} = \langle -2, 7 \rangle$
 $\mathbf{g} = \langle 10, -6 \rangle$
Find: $-7\mathbf{f} - 7\mathbf{g}$

114) $\mathbf{f} = \langle -9, -8 \rangle$
 $\mathbf{b} = \langle 0, -11 \rangle$
Find: $-2\mathbf{f} - 5\mathbf{b}$

115) $\mathbf{u} = \langle -5, -4 \rangle$
Unit vector in the direction of \mathbf{u}

116) $\mathbf{f} = \langle 12, -10 \rangle$
 $\mathbf{b} = \langle -2, 6 \rangle$
Find: $-10\mathbf{f} + 6\mathbf{b}$

Find the component form, magnitude, and direction angle of the resultant vector.

117) $\mathbf{f} = \langle 12, 7 \rangle$
 $\mathbf{g} = \langle 5, 3 \rangle$
Find: $-6\mathbf{f} + 2\mathbf{g}$

118) $\mathbf{a} = \langle 12, -4 \rangle$
 $\mathbf{g} = \langle 12, 12 \rangle$
Find: $4\mathbf{a} + 8\mathbf{g}$

Express the resultant vector as a linear combination of unit vectors \mathbf{i} and \mathbf{j} , and find the magnitude and direction angle.

119) $\mathbf{f} = 4\mathbf{i}$
 $\mathbf{g} = 8\mathbf{i} - \mathbf{j}$
Find: $-8\mathbf{f} + 4\mathbf{g}$

120) $\mathbf{u} = -8\mathbf{i} + 11\mathbf{j}$
 $\mathbf{v} = -\mathbf{i} - 12\mathbf{j}$
Find: $-10\mathbf{u} + 5\mathbf{v}$

Draw a diagram to illustrate the horizontal and vertical components of the vector. Then find the magnitude of each component.

121) $|\mathbf{a}| = 11, 280^\circ$

122) $|\mathbf{m}| = 29, 37^\circ$

Draw a vector diagram to find the resultant of each pair of vectors using the triangle method. Then state the magnitude and direction angle of the resultant.

123) $\mathbf{t} = \langle -5, 12 \rangle$ $\mathbf{u} = \langle 8, 15 \rangle$

124) $\mathbf{t} = \langle 8, 15 \rangle$ $\mathbf{u} = \langle 5, -12 \rangle$

Draw a vector diagram to find the resultant of each set of vectors. Then state the magnitude and direction angle of the resultant.

125) $\mathbf{a} = \langle -14, 12 \rangle$ $\mathbf{b} = \langle 5, 13 \rangle$ $\mathbf{c} = \langle 5, -12 \rangle$

126) $\mathbf{t} = \langle 5, -12 \rangle$ $\mathbf{u} = \langle -8, 6 \rangle$ $\mathbf{v} = \langle -8, 15 \rangle$

Use the given vectors to draw a vector diagram for each expression using the triangle method. Then state the magnitude and direction angle of the resultant.

127) $\mathbf{a} = \langle -8, 15 \rangle$ $\mathbf{b} = \langle 19, 2 \rangle$
 $9\mathbf{a} + \mathbf{b}$

128) $\mathbf{m} = \langle 12, 16 \rangle$ $\mathbf{n} = \langle 1, -10 \rangle$
 $-8\mathbf{m} - 3\mathbf{n}$

Use the given vectors to draw a vector diagram for each expression using the parallelogram method. Then state the magnitude and direction angle of the resultant.

129) $\mathbf{a} = \langle -10, 1 \rangle$ $\mathbf{b} = \langle 6, -5 \rangle$
 $-7\mathbf{a} - 9\mathbf{b}$

130) $\mathbf{a} = \langle 12, 16 \rangle$ $\mathbf{b} = \langle 3, -14 \rangle$
 $2\mathbf{a} + 3\mathbf{b}$

Find the dot product of the given vectors.

131) $\mathbf{u} = \langle 2, -4 \rangle$
 $\mathbf{v} = \langle -3, 5 \rangle$

132) $\mathbf{u} = \langle 9, 2 \rangle$
 $\mathbf{v} = \langle -5, -7 \rangle$

133) $\mathbf{u} = 2\mathbf{i} + 9\mathbf{j}$
 $\mathbf{v} = -7\mathbf{i} + \mathbf{j}$

134) $\mathbf{u} = 3\mathbf{i} - 4\mathbf{j}$
 $\mathbf{v} = -3\mathbf{i} - 9\mathbf{j}$

State if the two vectors are parallel, orthogonal, or neither.

135) $\mathbf{u} = 7\mathbf{i} + 2\mathbf{j}$
 $\mathbf{v} = 2\mathbf{i} + 7\mathbf{j}$

136) $\mathbf{u} = -3\mathbf{i} + 3\mathbf{j}$
 $\mathbf{v} = 16\mathbf{i} - 12\mathbf{j}$

Find the measure of the angle between the two vectors.

137) $\mathbf{u} = 8\mathbf{i} + 5\mathbf{j}$
 $\mathbf{v} = 6\mathbf{i} + 8\mathbf{j}$

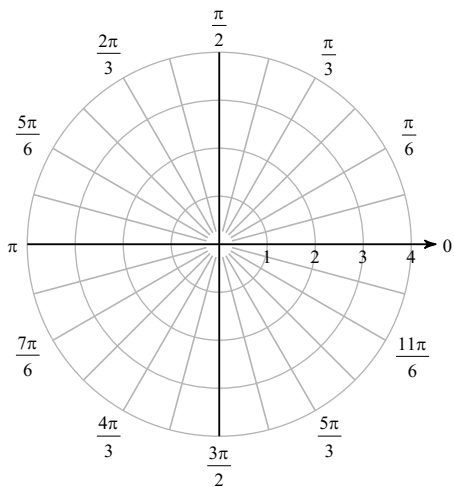
138) $\mathbf{u} = -9\mathbf{i} - 7\mathbf{j}$
 $\mathbf{v} = -8\mathbf{i} + 7\mathbf{j}$

139) $\mathbf{u} = -8\mathbf{i} - 3\mathbf{j}$
 $\mathbf{v} = -8\mathbf{i} + 5\mathbf{j}$

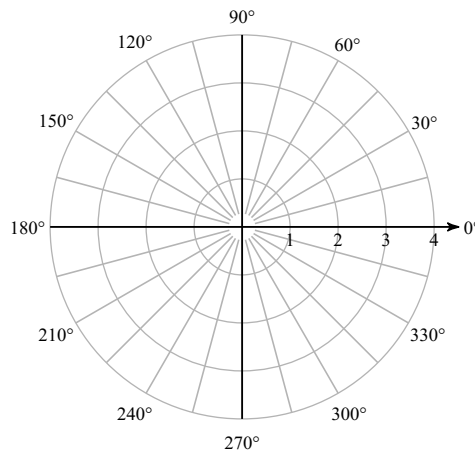
140) $\mathbf{u} = 6\mathbf{i} - 5\mathbf{j}$
 $\mathbf{v} = \mathbf{i} + \mathbf{j}$

Find all pairs of polar coordinates that describe the same point as the provided polar coordinates.

141) $\left(1, \frac{7\pi}{4}\right)$



142) $(2, 225^\circ)$



Convert each pair of polar coordinates to rectangular coordinates.

143) $(3, 300^\circ)$

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

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

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

146) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

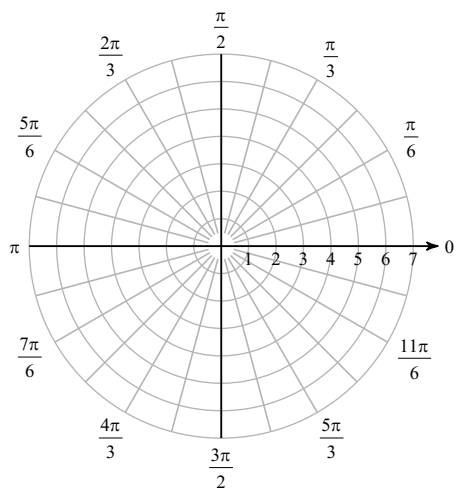
Two points are specified using polar coordinates. Find the distance between the points.

147) $\left(2, \frac{11\pi}{6}\right), \left(2, \frac{7\pi}{12}\right)$

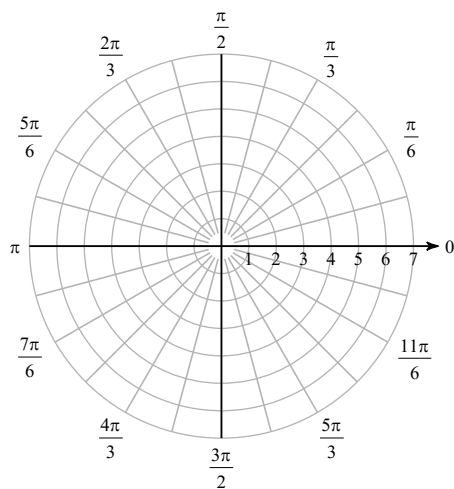
148) $\left(1, \frac{3\pi}{2}\right), \left(3, \frac{\pi}{4}\right)$

Convert each equation from polar to rectangular form. Then graph the polar equation.

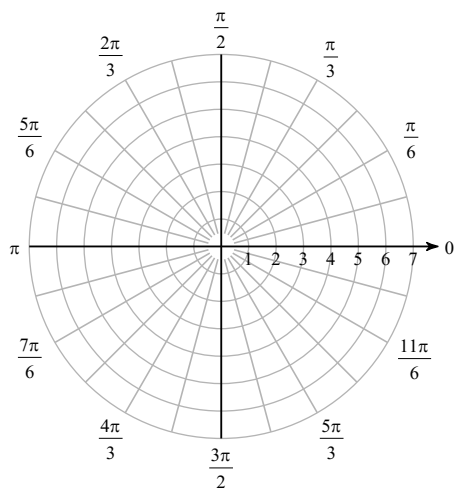
149) $\tan \theta = 5$



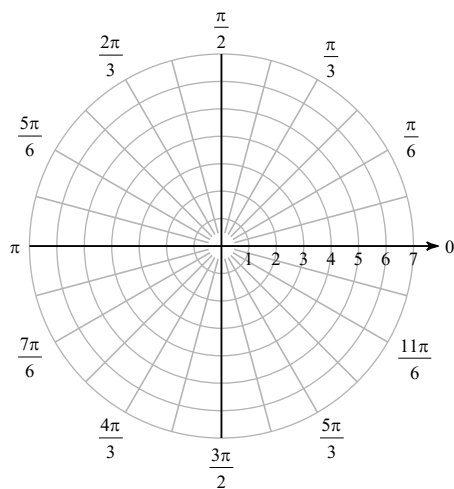
150) $\cot \theta = 5$



151) $\tan \theta = 4$

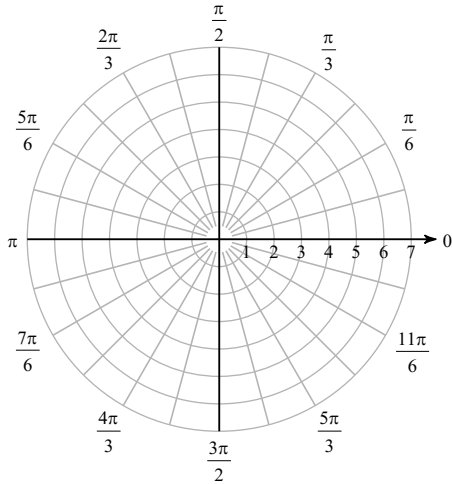


152) $\theta = \frac{\pi}{6}$

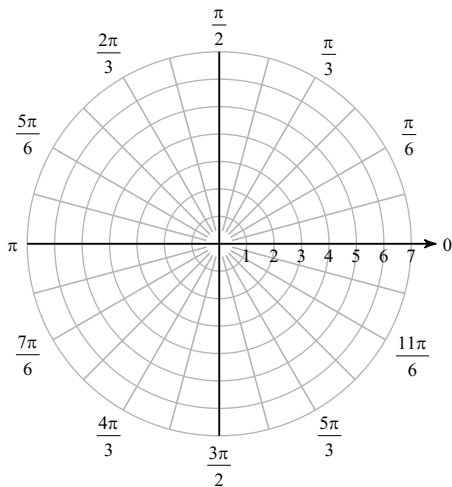


Consider each polar equation over the given interval. Classify the curve; determine if the graph is symmetric with respect to the origin, polar axis, and line $\theta=\pi/2$; find the values of θ where r is zero; find the maximum $|r|$ value and the values of θ where this occurs; and sketch the graph.

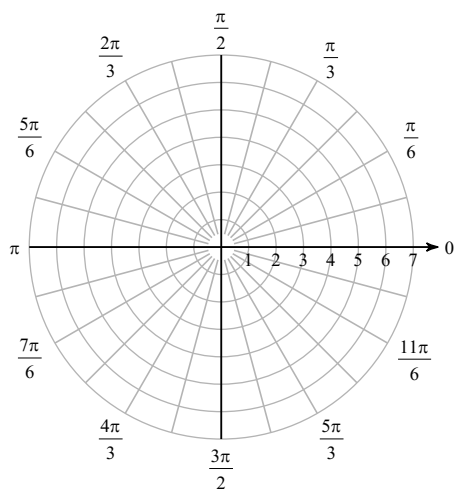
153) $r^2 = 25\sin(2\theta), 0 \leq \theta < 2\pi$



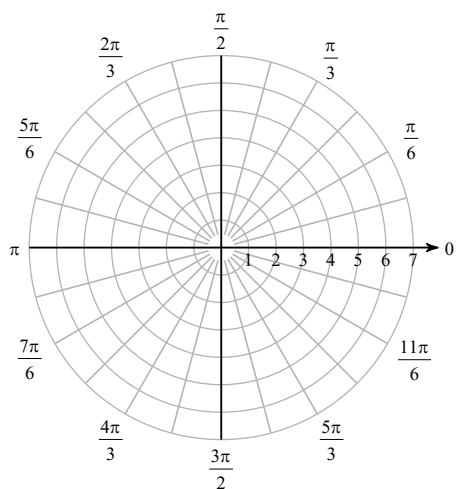
154) $r^2 = 4\sin(2\theta), 0 \leq \theta < 2\pi$



$$155) r^2 = 16\cos(2\theta), 0 \leq \theta < 2\pi$$



$$156) r^2 = 49\sin(2\theta), 0 \leq \theta < 2\pi$$



Convert numbers in rectangular form to polar form and numbers in polar form to rectangular form.

$$157) 4\left(\cos \frac{\pi}{4} + i\sin \frac{\pi}{4}\right)$$

$$158) 3(\cos 45 + i\sin 45)$$

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

$$159) 4(\cos 210 + i\sin 210) \cdot 5(\cos 120 + i\sin 120)$$

$$160) (6 + 6i)(-2 + 4i)$$

$$161) \frac{6(\cos 60 + i\sin 60)}{3(\cos 225 + i\sin 225)}$$

$$162) \frac{\sqrt{15}(\cos 300 + i\sin 300)}{2\sqrt{5}(\cos 240 + i\sin 240)}$$

$$163) (5(\cos 60 + i\sin 60))^3$$

$$164) (2(\cos 60 + i\sin 60))^4$$

Find the absolute value.

$$165) 6(\cos 90 + i\sin 90)$$

$$166) 2\sqrt{2} - 2i\sqrt{2}$$

Answers to Final Exam Review (ID: 1)

1) -0.52

2) -0.16

3) $\frac{\sqrt{106}}{5}$ and $\frac{5}{9}$

4) $\frac{3\sqrt{7}}{7}$ and $\frac{4\sqrt{7}}{7}$

5) $\sec^2 x + \cot^2 x$

Use $\tan^2 x + 1 = \sec^2 x$

6) $\frac{\csc^2 x}{\tan^2 x}$

Use $\cot x = \frac{1}{\tan x}$

$\tan^2 x + 1 + \cot^2 x$

Use $\cot^2 x + 1 = \csc^2 x$

$\tan^2 x + \csc^2 x$ ■

$\csc^2 x \cot^2 x$

Use $\csc x = \frac{1}{\sin x}$

$\frac{\cot^2 x}{\sin^2 x}$ ■

7) $\sec x + \cos x$

Decompose into sine and cosine

8) $\frac{\cot^2 x}{\sin x}$

Use $\cot x = \frac{1}{\tan x}$

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

Simplify

$\frac{1}{\tan^2 x \sin x}$

Use $\csc x = \frac{1}{\sin x}$

$\frac{\cos^2 x + 1}{\cos x}$ ■

$\frac{\csc x}{\tan^2 x}$ ■

9) $\frac{\cot x}{\sec^2 x}$

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

10) $\frac{\tan x}{\sec^3 x}$

Decompose into sine and cosine

$\frac{\cos x}{\sec^2 x \sin x}$

Use $\sec x = \frac{1}{\cos x}$

$\frac{\sin x}{\cos x}$
 $\left(\frac{1}{\cos x}\right)^3$

Simplify

$\frac{\cos^3 x}{\sin x}$ ■

$\cos^2 x \sin x$ ■

11) $2\cos^2 x(1 - \cos 2x)$

Use $\cos 2x = 1 - 2\sin^2 x$

12) $2\sin^2 x \cos x$

Use $\sin 2x = 2\sin x \cos x$

$4\cos^2 x \sin^2 x$

Use $\sin 2x = 2\sin x \cos x$

$\sin x \sin 2x$

Use $\csc x = \frac{1}{\sin x}$

$\sin^2 2x$ ■

$\frac{\sin 2x}{\csc x}$ ■

13) $\frac{\cos x}{\tan 2x}$ Use $\tan 2x = \frac{\sin 2x}{\cos 2x}$

$\frac{\cos x \cos 2x}{\sin 2x}$ Use $\sin 2x = 2 \sin x \cos x$

$\frac{\cos x \cos 2x}{2 \sin x \cos x}$ Cancel common factors

$\frac{\cos 2x}{2 \sin x}$ ■

14) $\tan x + \sec^2 x$ Decompose into sine and cosine

$\frac{\sin x}{\cos x} + \left(\frac{1}{\cos x}\right)^2$ Simplify

$\frac{\sin x \cos x + 1}{\cos^2 x}$ Use $\cos^2 x = \frac{1 + \cos 2x}{2}$

$\frac{2(\sin x \cos x + 1)}{1 + \cos 2x}$ ■

15) $\frac{\sqrt{2 + \sqrt{2}}}{2}$

16) $\frac{\sqrt{2 + \sqrt{2}}}{2}$

17) $-\frac{\sqrt{5}}{5}$

18) $\frac{\sqrt{10}}{10}$

19) 0

20) $\frac{\pi}{6}$

21) $\frac{\pi}{3}$

22) $-\frac{\pi}{6}$

23) $\frac{\pi}{2}$

24) $\frac{\pi}{3}$

25) $\frac{\pi}{4}$

26) $\frac{\pi}{4}$

27) $-\frac{\pi}{3}$

28) 0

29) $\frac{\pi}{6}$

30) $\frac{\pi}{2}$

31) $\frac{5}{3}$

32) 0

33) $\frac{11\sqrt{57}}{57}$

34) $-\frac{\pi}{2}$

35) 0

36) $\frac{6\sqrt{2}}{7}$

37) 0

38) $\frac{\sqrt{22}}{11}$

39) 0

40) $\frac{7\sqrt{13}}{13}$

41) $-\frac{\pi}{4}$

42) $\frac{5}{3}$

43) $\frac{x}{\sqrt{1-x^2}}$

44) $\frac{1}{x}$

45) $\sqrt{1-x^2}$

46) $\frac{\sqrt{1+x^2}}{x}$

47) $\frac{\sqrt{1-x^2}}{x}$

48) $\frac{1}{\sqrt{1-x^2}}$

49) $\frac{1}{2}$

50) $-\frac{\sqrt{3}}{3}$

51) $\frac{\sqrt{2}}{2}$

52) $\frac{1}{2}$

53) $\cos 3\theta$

54) $\tan -\theta$

55) $\cos 11v$

56) $\tan -8x$

57) $\frac{\sqrt{x^2+1}}{x^2+1}$

58) $\frac{x-1}{1+x}$

$$59) \sin\left(\theta - \frac{3\pi}{2}\right)$$

$$= \sin \theta \cos \frac{3\pi}{2} - \cos \theta \sin \frac{3\pi}{2}$$

$$= \sin \theta \cdot 0 - \cos \theta \cdot -1$$

$$= \cos \theta$$

$$60) \sin\left(\frac{\pi}{2} + \theta\right)$$

$$= \sin \frac{\pi}{2} \cos \theta + \cos \frac{\pi}{2} \sin \theta$$

$$= \cos \theta + 0 \sin \theta$$

$$= \cos \theta$$

61) None

62) None

63) None

64) One triangle

65) 11

66) Not a triangle

67) 37.5 or 8.8

68) 23

69) 34°

70) 30°

71) 42°

72) 76.3° or 71.7°

73) Not a triangle

74) $m\angle T = 20^\circ, s = 14, t = 7$

75) $m\angle B = 25.4^\circ, m\angle C = 81.6^\circ, a = 29 \text{ m}$

76) $m\angle B = 24^\circ, m\angle C = 41^\circ, m\angle A = 115^\circ$

77) $m\angle C = 46.3^\circ, m\angle A = 44.7^\circ, b = 40.8 \text{ in}$

78) $m\angle A = 41.6^\circ, m\angle B = 49.4^\circ, c = 31.6 \text{ in}$

79) $m\angle A = 46.2^\circ, m\angle B = 26.8^\circ, c = 31.8 \text{ mi}$

80) $m\angle A = 65.6^\circ, m\angle B = 94.1^\circ, m\angle C = 20.3^\circ$

81) $m\angle C = 26^\circ, m\angle A = 137^\circ, m\angle B = 17^\circ$

82) $m\angle B = 59.5^\circ, m\angle C = 65.1^\circ, m\angle A = 55.4^\circ$

83) 31.7 in

84) 42.4 mi

85) 9 yd

86) 17 in

87) 19.6 in²

88) 87.5 m²

89) 8.2 cm²

90) 44.1 m²

91) 70.1 yd²

92) 9.8 in²

93) 9.6 yd²

94) 19.9 km²

95) $\langle 2, 0 \rangle$

96) $\langle 4, 10 \rangle$

97) $\langle 8, 20 \rangle$

98) $\langle -34, 12 \rangle$

99) $\langle 14, 56 \rangle$

100) $\langle 6, 10 \rangle$

101) $-10\mathbf{i} + 203\mathbf{j}$

102) $5\mathbf{i} - 7\mathbf{j}$

103) $8\mathbf{i} - 2\mathbf{j}$

104) $\frac{\sqrt{2} \cdot \mathbf{i}}{2} + \frac{\sqrt{2} \cdot \mathbf{j}}{2}$

105) $-30\mathbf{i} + \sqrt{1309} \cdot \mathbf{j}$

106) $-7\sqrt{3} \cdot \mathbf{i} - 17\sqrt{3} \cdot \mathbf{j}$

107) $-\frac{3\sqrt{10} \cdot \mathbf{i}}{10} + \frac{\sqrt{10} \cdot \mathbf{j}}{10}$

108) $\left\langle \frac{\sqrt{19}}{19}, \frac{3\sqrt{38}}{19} \right\rangle$

109) 251.57°

110) 102.68°

111) 317.49°

112) 247.38°

113) $7\sqrt{65} \approx 56.436; 187.13^\circ$

114) $\sqrt{5365} \approx 73.246; 75.77^\circ$

115) 218.66°

116) $4\sqrt{2245} \approx 189.526; 134.14^\circ$

117) $\langle -62, -36 \rangle$

118) $\langle 144, 80 \rangle$

$2\sqrt{1285} \approx 71.694; 210.14^\circ$

$16\sqrt{106} \approx 164.73; 29.05^\circ$

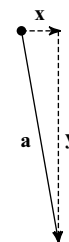
119) $-4\mathbf{j}$

120) $75\mathbf{i} - 170\mathbf{j}$

121)

4; 270°

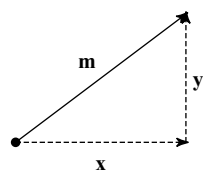
$5\sqrt{1381} \approx 185.809; 293.81^\circ$



Horizontal: 1.91

Vertical: -10.83

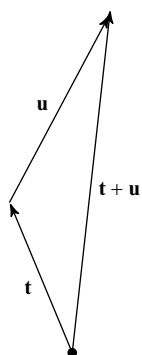
122)



Horizontal: 23.16

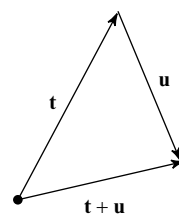
Vertical: 17.45

123)



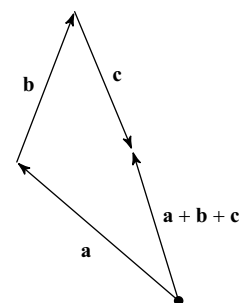
27.17; 83.66°

124)

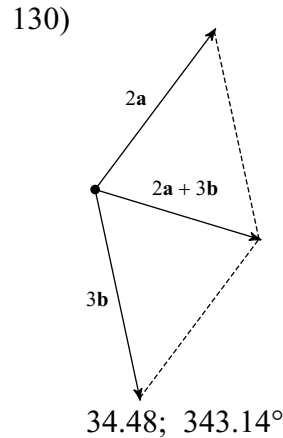
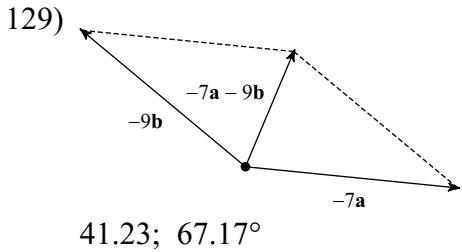
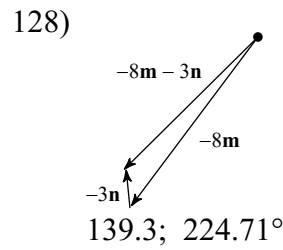
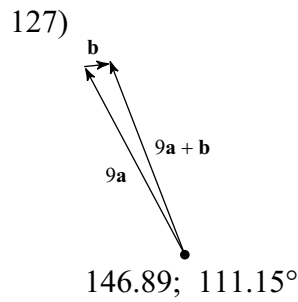
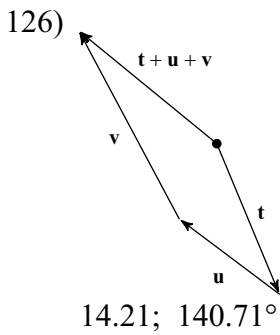


13.34; 12.99°

125)



13.6; 107.1°



131) -26

132) -59

133) -5

134) 27

135) *Neither*

136) *Neither*

137) 21.12°

138) 79.06°

139) 52.56°

140) 84.81°

141) $\left(1, \frac{7\pi}{4} + 2n\pi\right)$ and $\left(-1, \frac{7\pi}{4} + (2n+1)\pi\right)$

where n is an integer

142) $(2, 225^\circ + 360n^\circ)$ and $(-2, 45^\circ + 360n^\circ)$
where n is an integer

143) $\left(\frac{3}{2}, -\frac{3\sqrt{3}}{2}\right)$

144) $\left(\frac{3\sqrt{2}}{2}, -\frac{3\sqrt{2}}{2}\right)$

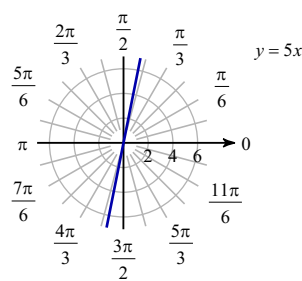
145) $\left(1, \frac{7\pi}{4}\right)$

146) $\left(1, \frac{\pi}{3}\right)$

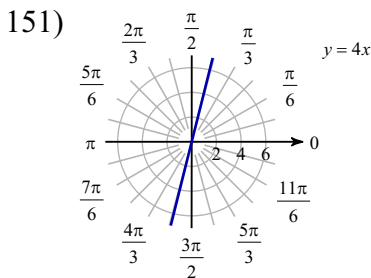
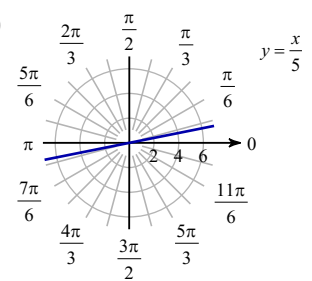
147) $2\sqrt{2} + \sqrt{2} \approx 3.696$

148) $\sqrt{10 + 3\sqrt{2}} \approx 3.774$

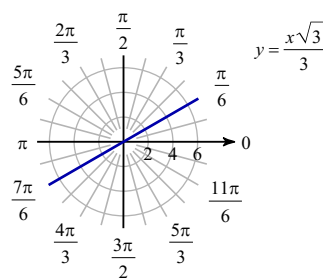
149)

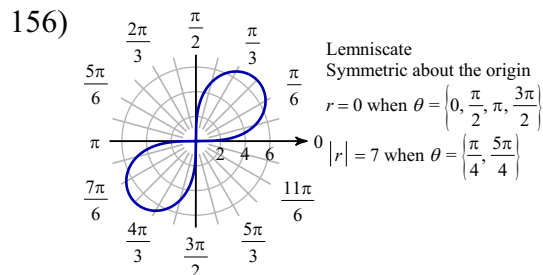
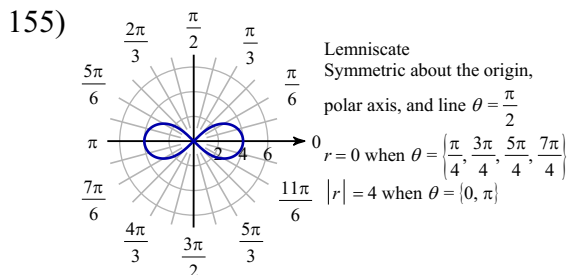
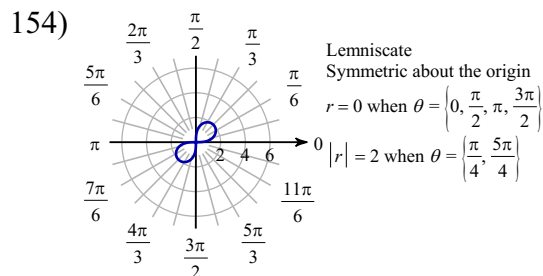
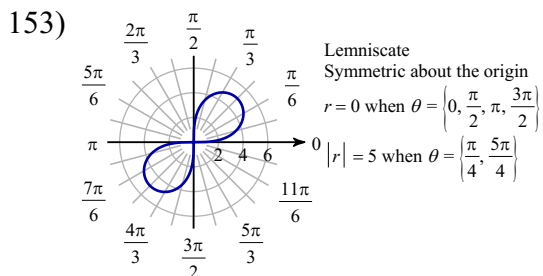


150)



152)





157) $2\sqrt{2} + 2i\sqrt{2}$

158) $\frac{3\sqrt{2}}{2} + \frac{3\sqrt{2}}{2}i$

159) $20(\cos 330 + i\sin 330)$

160) $-36 + 12i$

161) $2(\cos -165 + i\sin -165)$

162) $\frac{\sqrt{3}}{2}(\cos 60 + i\sin 60)$

163) $125(\cos 180 + i\sin 180)$

164) $16(\cos 240 + i\sin 240)$

165) 6

166) 4