Precal 41 Name: _____

Final Review Date: _____

The following is extra practice for the final exam. Note: You should STUDY in addition to completing this packet!!! Do not use a calculator unless the question number/letter is marked with an *.

Rationals

*1. Find ALL zeros. (real and/or complex) $f(x) = x^5 - 18x^3 + 30x^2 - 19x + 30$

2. Write a polynomial with least degree that has the following zeros. -3, 1, 4i

3. Is (x-2) a factor of $x^3 + 3x^2 + 5x - 30$? If yes, factor the polynomial completely.

4. Find the x-asymptote(s), y-asymptote, oblique asymptote, x-intercept(s), y-intercept, and/or hole(s) for the following functions.

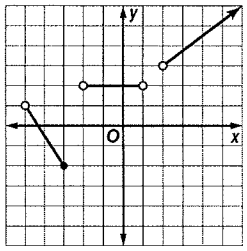
a. $f(x) = \frac{x^2+2x-3}{x+2}$ b. $f(x) = \frac{x-2}{x^2-6x+8}$

5. Find the end behavior of $f(x) = 4x^3 - 5x^2 + 2x + 3$.

$\lim_{x\to\infty} g(x) =$

$\lim_{x\to-\infty} g(x) =$

6. State the domain and range of the function shown



7. Find the inverse of $f(x) = \frac{3x}{x-2}$.

8. Find the domain of the following functions.

a. $y = \sqrt{x+3}$ b. $f(x) = \frac{2}{x^3 - 3x^2 - 10x}$

Exponential/Logarithmic

9. Condense: $2 \log x - \log 3$

10. Expand: $\log_9 \frac{x^2}{13y^5}$

11. Solve:

a. $8^{2x+3} = \left(\frac{1}{4}\right)^{x+1}$ b. $\log_2 x^3 = 6$ c. $\log_4(2x) + \log_4(x-2) = 2$

12. Evaluate: $\log_{16} \frac{1}{4}$

*13. Suppose $1750 is put into an account that pays an annual rate of 4.25% compounded weekly. How much will be in the account after 36 months?

*14. A scientist has 37 grams of a radioactive substance that decays 30% continuously. How many grams of radioactive substance remain after 9 years?

Polar

15. Find the rectangular coordinates of:

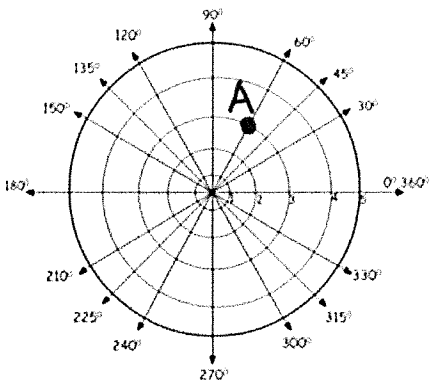
a. $(4, 120°)$ b. $(-2, 3\pi/4)$ c. $(3, -\pi/3)$

16. Find one set of polar coordinates for the following rectangular coordinates if r > 0:

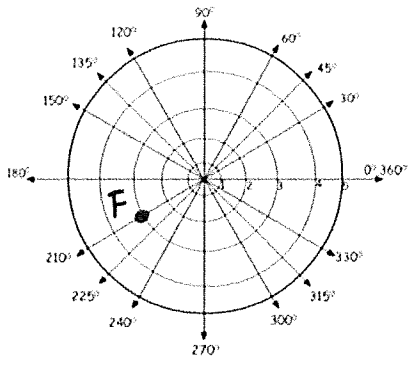
*a. (3, 6) *b. (-2, 7) c. (-1, -1)

17. Name the polar coordinates of points A and F graphed below if:
i. r>0 and $0 \leq \theta \leq 360°$ ii. r<0 and $0 \leq \theta \leq 360°$

a.

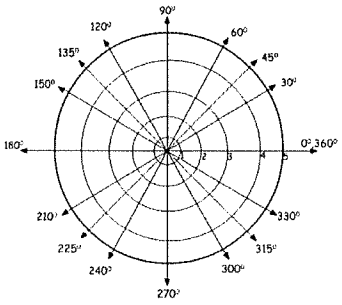


b.

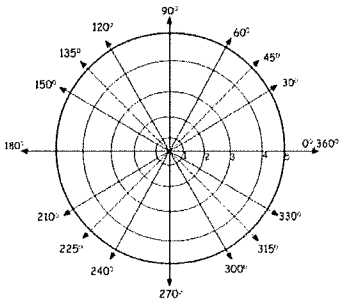


18. Graph the polar equations:

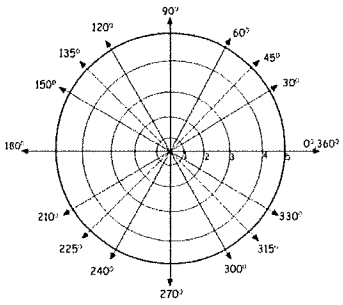
*a. $r = 3 + 3\sin\theta$



b. $\theta = -\pi/6$



*c. $r = 5\cos\theta$



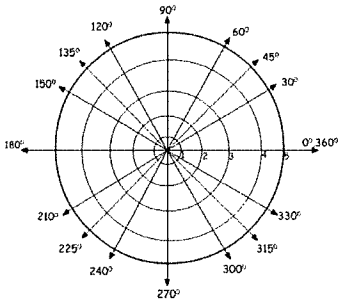
19. Write the polar equations in rectangular form:

a. $r = -6\sin\theta$

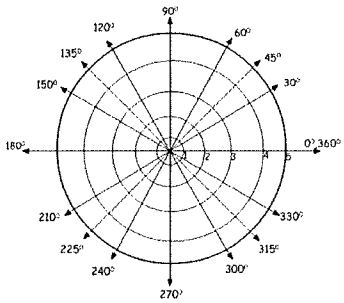
b. $r = 2\cos\theta$

20. Write the rectangular equations in polar form, then graph:

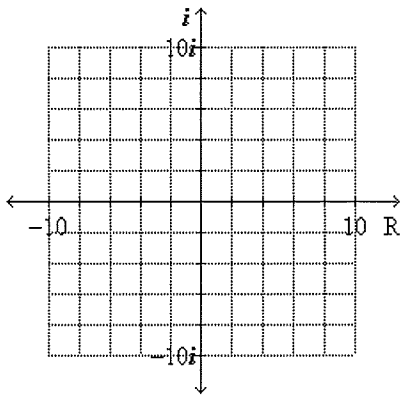
a. $x^2 + y^2 = 16$



b. $(x-2)^2 + y^2 = 4$

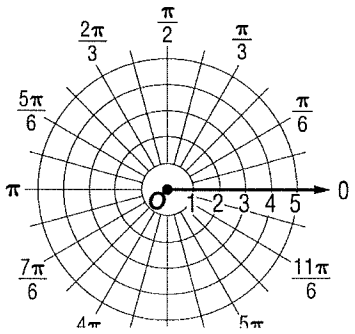


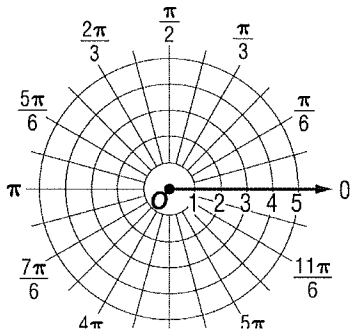
21. Graph the number $-3 + 4i$ in the complex plane and find its absolute value.

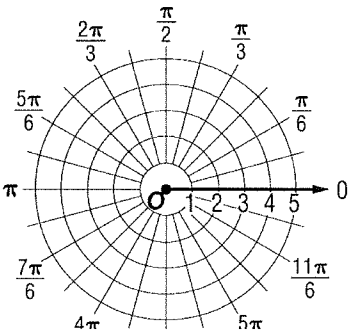


*22. Graph the polar equation and state the symmetry.

a. $r = 2 - 2\sin\theta$ b. $r = 3 + 2\cos\theta$ c. $r = 3\sec\theta$







*23. Write the number $-2 - 3i$ in polar form. Round the angle to the nearest degree.

Vectors

24. Find $5\mathbf{r} - 2\mathbf{s}$ if $\mathbf{r} = \langle 3, 9\rangle$ and $\mathbf{s} = \langle -3, 6\rangle$

25. Let $\overrightarrow{AB}$ be the vector with initial point $A(10, -4)$ and terminal point $B(-1, -3)$. Write $\overrightarrow{AB}$ as a linear combination of the vectors **i** and **j**.

26. Find the magnitude of $\overrightarrow{AB}$ with initial point $A(3, -7)$ and terminal point $B(8, -9)$.

27. Find the component form of $\overrightarrow{AB}$ with initial point $A(-12, 7)$ and terminal point $B(8, -2)$.

*28. Find the direction angle. Round to the nearest degree, when necessary.

a. $\langle -2, 3\rangle$ b. $3\mathbf{i} - 3\mathbf{j}$

*29. A plane takes off at 220 miles per hour at an angle of 51° with the ground. Find the magnitude of the horizontal and vertical components of its velocity. Round to the nearest tenth.

*30. Charles leaves his apartment and walks 55° north of west for 1000 feet and then walks 300 feet due north to go bowling. How far and at what **quadrant bearing** is Charles from his apartment?

Parametric

31. Write the following parametric equations in rectangular form:

a. $x = 3t - 1 \quad y = 2t^2 + 6$

b. $x = 4\cos\theta \quad y = 2\sin\theta$

*32. Suppose Mr. Shanazu hit a golf ball with an initial velocity of 150 feet per second at an angle of 30^o to the horizontal. Round all answers to the *nearest hundredth.*

a) Write a set of parametric equations that describe the position of the ball as a function of time.

b) How long is the golf ball in the air?

c) When is the ball at its maximum height?

d) What is the maximum height of the golf ball?

e) His goal was to hit the golf ball at least 600 feet. Did he reach his goal? How far away did the golf ball land?

Trigonometry

33. A point (6, 8) is on the terminal side of angle θ. Find the exact value of the $\cos\theta$.

*34. A point (21, 28) is on the terminal side of angle θ. Find the exact value of the $\csc\theta$.

35. A point (2, -3) is on the terminal side of angle θ. Find the exact value of the $\sin\theta$.

36. Find the exact value of cos 75°.

37. Find the exact value of tan 15°.

38. Name the quadrant in which the angle θ lies if:

a. $\cos\theta < 0,\ \csc\theta < 0$ _____

b. $\cot\theta < 0,\ \cos\theta > 0$ _____

c. $\sec\theta < 0,\ \tan\theta < 0$ _____

d. $\sin\theta > 0,\ \cos\theta > 0$ _____

39. Find the exact value of the 5 remaining trig functions if $\sec\theta = \frac{9}{8}$ and θ is in Quadrant 4.

$\sin\theta =$ _____ $\csc\theta =$ _____

$\cos\theta =$ _____ $\sec\theta =$ _____

$\tan\theta =$ _____ $\cot\theta =$ _____

40. Find the exact value of $\cos 2\theta$, if $\cos\theta = \frac{8}{17}$ and $\frac{3\pi}{2} < \theta < 2\pi$

41. Find the exact value of the expression: $\tan^{-1}(-\sqrt{3}) =$ _____

42. Find the exact value of the expression: $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) =$ _____

43. Find the exact value of the expression: $\cos^{-1}\left(\frac{-\sqrt{2}}{2}\right) =$ _____

44. Find the exact value of the expression: $\cos\left(\sin^{-1}\left(\frac{1}{4}\right)\right) =$ _____

45. Find the exact value of the expression: $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right) =$ _____

46. Find the exact value of the expression: $\tan\left(\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right) =$ _____

*47. $\sin\theta = \frac{20}{29}$, $0 < \theta < \frac{\pi}{2}$, Find $\cos(2\theta)$ _____

48. Verify the identity: $\cos(\frac{\pi}{2} + \theta) = -\sin\theta$

49. Solve $6\cos x - 3 = 0$ in the interval $[0, 2\pi)$

50. Solve $2\sin x + 1 = 0$ in the interval $[0, 2\pi)$

51. Verify the identity: $\sin^2x \tan^2x \csc^2x + \cos^2x \tan^2x \csc^2x = \sec^2x$

52. Verify the identity: $\sec\theta = \sin\theta(\tan\theta + \cot\theta)$

53. Verify the identity: $\frac{\csc^2\theta - \cot^2\theta}{1 - \sin^2\theta} = \sec^2\theta$

54. Simplify the expression so there is a single trig term that is not a rational: $1 - \frac{\sin^2\theta}{1+\cos\theta}$

55. Solve in the interval $[0, 2\pi)$

a. $(\cot\theta + 1)(\csc\theta - \frac{1}{2}) = 0$

b. $\cos^2\theta - \sin^2\theta + \sin\theta = 0$

c. $2\sin^2\theta = 3(1 - \cos\theta)$

d. $\cos(2\theta) = 2 - 2\sin^2\theta$

56. What is the reference angle if $\theta = 247^0$

57. Name an angle that is coterminal with: $\frac{7\pi}{15}$

*58. Two observes simultaneously measure the angle of elevation of a helicopter. One angle measured is A: 25^0 and the other is B: 40^0. If the observers are 100 feet apart and the helicopter lies over the line joining them. How far away from the helicopter are the observers A and B?

*59. Solve the following triangles. Round to the nearest hundredth.

a. $a = 11cm, b = 6\ cm, A = 22^o$

b. $a = 13\ m, b = 12\ m, c = 8m$

c. $a = 9\ cm, b = 10\ cm, C = 42^o$

d. $a = 5\ cm, A = 36^o, B = 42^o$

e. $A = 63^o, a = 18in, b = 25in$

f. $A = 20^o, a = 4mm, b = 6mm$

*60. Determine the area of each triangle to the nearest tenth.

a. $A = 95°,\ b = 12m, c = 18\ m$

b. $a = 44, b = 47, c = 53$

Matrices

$A = \begin{bmatrix} -1 & 5 \\ 3 & 0 \end{bmatrix}$ $B = \begin{bmatrix} -4 & 2 & -1 \\ 0 & -5 & 3 \end{bmatrix}$ $C = \begin{bmatrix} -1 & 0 & -4 \\ 3 & -2 & 1 \end{bmatrix}$

*61. Evaluate each of the following.

a. $AB + C$

b. $3AC - B$

*62. Solve the system of equations.

$3x - y + 2z = -3$
$-x + 2y - z = 2$
$2x - 3y + z = -1$

$x =$_____ $y =$_____ $z =$_____

*63. Determine whether A and B are inverse matrices. Explain.

$A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix}$

Limits and Continuity

64. Determine whether each function is continuous at the given x-value(s). If discontinuous, identify the type of discontinuity as *infinite, jump,* or *removable.*

a. $f(x) = \frac{x-2}{x+4}$; at $x = -4$

b. $f(x) = \frac{x+1}{x^2+3x+2}$; at $x = -1$ and $x = -2$

65. Estimate each one-sided or two-sided limit, if it exists.

a. $\lim_{x \to 0^+}(4 - \sqrt{x})$

b. $\lim_{x \to 4} \frac{x^2 - 16}{x - 4}$

c. $\lim_{x \to -1} \frac{x+7}{x^2+8x+7}$

66. Evaluate each limit, if it exists.

a. $\lim_{x \to 3}(x^2 + 3x - 8)$

b. $\lim_{x \to -6} \frac{x^2 - 36}{x + 6}$

c. $\lim_{x \to 4} \sqrt{x^2 - 2x + 1}$

d. $\lim_{x-2} f(x)$ where $f(x) = \begin{cases} x - 1 & x < -2 \\ x^2 & x \geq -2 \end{cases}$

(1)

2	1	0	−18	30	−19	30
		2	4	−28	4	−30
	1	2	−14	2	−15	0
3		3	15	3	15	
	1	5	1	5	0	
−5		−5	0	−5		
	1	0	1	0		

$x^2+1=0$

$x^2=-1$

$x=\pm\sqrt{-1}=\pm i$

$\boxed{x=2,3,-5,\pm i}$

(2) $(x+3)(x-1)(x-4i)(x+4i)$

$(x^2+2x-3)(x^2+16)$

$x^4+16x^2+2x^3+32x-3x^2-48$

$\boxed{f(x)=x^4+2x^3+13x^2+32x-48}$

(3)

2	1	3	5	−30
		2	10	30
	1	5	15	0

yes!

$x^2+5x+15$

$\boxed{(x-2)(x^2+5x+15)}$

(4) a. $f(x)=\dfrac{(x+3)(x-1)}{x+2}$

$x+2\overline{)\,x^2+2x-3}$; x^2+2x ; 0

x-asymptote: $x=-2$

oblique asymptote: $y=x$

x-ints: $(-3,0)$ $(1,0)$

y-int: $(0,-3/2)$

b. $f(x)=\dfrac{x-2}{(x-4)(x-2)}$

x-asymptote: $x=4$

y-asymptote: $y=0$

no x-ints

y-int $(0,-1/4)$ hole @ $(2,-1/2)$

(5) $\lim_{x\to-\infty} g(x)=-\infty$

$\lim_{x\to\infty} g(x)=\infty$

(6) D: $(-5,-3]\cup(-2,1)\cup(2,\infty)$

R: $[-2,1]\cup[2]\cup(3,\infty)$

(7) $y=\dfrac{3x}{x-2}\rightarrow x=\dfrac{3y}{y-2}$

$xy-2x=3y$

$xy-3y=2x$

$y(x-3)=2x$

$y=\dfrac{2x}{x-3}$

$\boxed{f^{-1}(x)=\dfrac{2x}{x-3}}$

(8) a. $x\geq -3$

$[-3,\infty)$

b. $\dfrac{2}{x(x-5)(x+2)}$

R $\neq 0,-2,5$

$(-\infty,-2)\cup(-2,0)\cup(0,5)\cup(5,\infty)$

(9) $\log\dfrac{x^2}{3}$

(10) $2\log_9 x-\log_9 13-5\log_9 y$

(11) a. $2^{3(2x+3)}=2^{-2(x+1)}$

$6x+9=-2x-2$

$8x=-11$

$\boxed{x=-\frac{11}{2}}$

b. $2^6=x^3$

$64=x^3$

$\boxed{4=x}$

c. $2x(x-2)=4^2$

$2x^2-4x=16$

$x^2-2x-8=0$

$(x-4)(x+2)=0$

$\boxed{x=4}$ ~~$x=2$~~

(12) $16^x=\dfrac{1}{4}$

$4^{2x}=4^{-1}$

$\boxed{x=-\frac{1}{2}}$

(13) $A=1750\left(1+\frac{.0425}{52}\right)^{52\cdot 3}$

$=\boxed{\$1987.87}$

(14) $A=37e^{-3(9)}$

$=\boxed{2.5\text{ g}}$

(15) a. $(4\cos 120°, 4\sin 120°)$

$(-2, 2\sqrt{3})$

b. $\left(-2\cos\frac{3\pi}{4}, -2\sin\frac{3\pi}{4}\right)$

$(\sqrt{2}, -\sqrt{2})$

c. $\left(3\cos\frac{-\pi}{3}, 3\sin\frac{-\pi}{3}\right)$

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

(16) a. $r=3\sqrt{5}$ $\theta=63.4°$

$(3\sqrt{5}, 63.4°)$

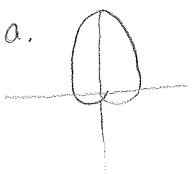
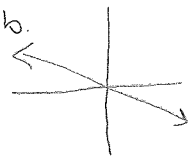
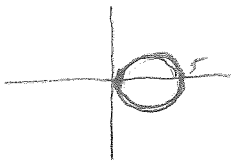
b. $r=\sqrt{53}$ $\theta=105.9°$

$(\sqrt{53}, 105.9°)$

c. $r=\sqrt{2}$ $\theta=225°$

$(\sqrt{2}, 225°)$

(17) a. i. $(3, 60°)$ ii. $(-3, 240°)$ b. i. $(3, 210°)$ ii. $(-3, 30°)$

(18) a.  b.  c. 

(19) a. $r^2 = -6r\sin\theta$

$x^2 + y^2 = -6y$

$x^2 + y^2 + 6y + 9 = 9$

$\boxed{x^2 + (y+3)^2 = 9}$

b. $r^2 = 2r\cos\theta$

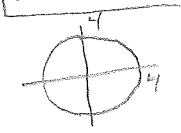
$x^2 + y^2 = 2x$

$x^2 - 2x + 1 + y^2 = 1$

$\boxed{(x-1)^2 + y^2 = 1}$

(20) a. $r^2 = 4$

$\boxed{r = 4 \text{ or } r = -4}$

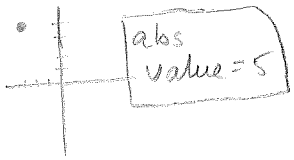


b. $x^2 - 4x + 4 + y^2 = 4$

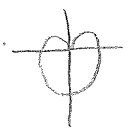
$x^2 + y^2 = 4x$

$r^2 = 4r\cos\theta$

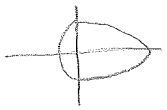
$\boxed{r = 4\cos\theta}$

(21) 

$\boxed{\text{abs value} = 5}$

(22) a. 

Symm: $\theta = \frac{\pi}{2}$

b. 

Symm: polar axis

c. 

Symm: polar axis

(23) $r = \sqrt{13}$ $\theta = 236°$

$\boxed{\sqrt{13}(\cos 236° + i\sin 236°)}$

(24) $\langle 21, 33\rangle$

(25) $\langle -11, 1\rangle$

$\boxed{-11i + j}$

(26) $\langle 5, -2\rangle$

$\boxed{|\overrightarrow{AB}| = \sqrt{29}}$

(27) $\langle 20, -9\rangle$

(28) a. $\theta = 124°$

b. $\theta = -45°$ or $315°$

(29) $x = 220\cos 51° = \boxed{138.5 \text{ mph}}$

$y = 220\sin 51° = \boxed{171.0 \text{ mph}}$

(30) 

$\langle 0, 300\rangle$

$\langle 1000\cos 55, 1000\sin 155\rangle$

$\langle 573.58, 819.15\rangle$

$r: \langle 573.58, 1119.15\rangle$

$|r| = \boxed{1257.57 \text{ ft}}$

$\theta = 62.9°$ $\boxed{N27.1°E}$

(31) a. $t = \frac{x+1}{3}$

$y = 2\left(\frac{x+1}{3}\right)^2 + 6$

$= 2\left(\frac{x^2+2x+1}{9}\right) + 6$

$\boxed{y = \frac{2x^2}{9} + \frac{4x}{9} + \frac{56}{9}}$

b. $\frac{x}{4} = \cos\theta$ $\frac{y}{2} = \sin\theta$

$\left(\frac{y}{2}\right)^2 + \left(\frac{x}{4}\right)^2 = 1$

$\boxed{\frac{y^2}{4} + \frac{x^2}{16} = 1}$

(32) a. $x = t \cdot 150 \cdot \cos 30°$

$y = t \cdot 150\sin 30° - 16t^2$

b. 4.69 sec.

c. 2.34 sec.

d. 87.89 ft.

e. $x = \boxed{609.25 \text{ yes!}}$

(33) $r = 10$

$\boxed{\cos\theta = \frac{6}{10} = \frac{3}{5}}$

(34) $r = 35$

$\boxed{\csc\theta = \frac{35}{28} = \frac{5}{4}}$

(35) $r = \sqrt{13}$

$\boxed{\sin\theta = \frac{-3}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}}$

(36) $\cos 75° = \cos(30° + 45°) = \cos 30\cos 45 - \sin 30\sin 45 = \frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2} - \frac{1}{2}\cdot\frac{\sqrt{2}}{2}$

$= \boxed{\frac{\sqrt{6} - \sqrt{2}}{4}}$

(37) $\tan 15 = \tan(60-45) = \frac{\tan 60 - \tan 45}{1 + \tan 60\tan 45} = \frac{\sqrt{3}-1}{1+\sqrt{3}}$

$= \frac{(\sqrt{3}-1)(1-\sqrt{3})}{(1+\sqrt{3})(1-\sqrt{3})} = \frac{-4+2\sqrt{3}}{-2} = \boxed{2-\sqrt{3}}$

(38) a. III

b. IV

c. II

d. I

(39) $r = 9$ $x = 8$ $y = -\sqrt{17}$

$\sin\theta = \frac{-\sqrt{17}}{9}$ $\csc\theta = \frac{-9\sqrt{17}}{17}$

$\cos\theta = \frac{8}{9}$ $\sec\theta = \frac{9}{8}$

$\tan\theta = \frac{-\sqrt{17}}{8}$ $\cot\theta = \frac{-8\sqrt{17}}{17}$

(40) $\cos 2\theta = 2\cos^2\theta - 1$

$= 2\left(\frac{8}{17}\right)^2 - 1$

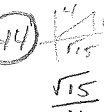
$= 2\left(\frac{64}{289}\right) - 1$

$= \frac{128}{289} - \frac{289}{289} = \boxed{\frac{-161}{289}}$

(41) $-\frac{\pi}{3}$

(42) $\frac{\pi}{4}$

(43) $\frac{3\pi}{4}$

(44) 

$\frac{\sqrt{15}}{4}$

(45) $\frac{5\pi}{6}$

(46) $-\sqrt{3}$

(47) $\cos 2\theta = 1 - 2\sin^2\theta$

$= 1 - 2\left(\frac{20}{29}\right)^2 = 1 - 2\left(\frac{400}{841}\right)$

$= 1 - \frac{800}{841} = \boxed{\frac{41}{841}}$

(48) $\cos\left(\frac{\pi}{2} + \theta\right)$

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

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

$= -\sin\theta$ ✓

(49) $\cos x = \frac{1}{2}$

$\boxed{x = \frac{\pi}{3}, \frac{5\pi}{3}}$

(50) $\sin x = -\frac{1}{2}$ $\boxed{x = \frac{7\pi}{6}, \frac{11\pi}{6}}$

(51) $\sin^2x\tan^2x\csc^2x + \cos^2x\tan^2x\csc^2x$

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

$= \frac{\sin^2x}{\cos^2x} + 1 = \tan^2x + 1 = \sec^2x$ ✓

(52) $\sin\theta(\tan\theta + \cot\theta)$

$\sin\theta\cdot\frac{\sin\theta}{\cos\theta} + \sin\theta\cdot\frac{\cos\theta}{\sin\theta}$

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

$= \frac{\sin^2\theta + \cos^2\theta}{\cos\theta} = \frac{1}{\cos\theta} = \sec\theta$ ✓

(53) $\frac{\csc^2\theta - \cot^2\theta}{1 - \sin^2\theta} = \frac{1}{\cos^2\theta} = \sec^2\theta$ ✓

(54) $1 - \frac{\sin^2\theta(1-\cos\theta)}{(1+\cos\theta)(1-\cos\theta)}$

$= 1 - \frac{\sin^2\theta(1-\cos\theta)}{1-\cos^2\theta}$

$= 1 - \frac{\sin^2\theta(1-\cos\theta)}{\sin^2\theta}$

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

$= \boxed{\cos\theta}$

(55) a. $\cot\theta = -1$ ~~$\csc\theta = 1/2$~~

$\boxed{\theta = \frac{3\pi}{4}, \frac{7\pi}{4}}$

b. $1 - \sin^2\theta - \sin^2\theta + \sin\theta = 0$

$-2\sin^2\theta + \sin\theta + 1 = 0$

$2\sin^2\theta - \sin\theta - 1 = 0$

$(2\sin\theta + 1)(\sin\theta - 1) = 0$

$\sin\theta = -1/2$ $\sin\theta = 1$

$\boxed{\theta = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}}$

c. $2(1-\cos^2\theta) = 3 - 3\cos\theta$

$2 - 2\cos^2\theta = 3 - 3\cos\theta$

$0 = 2\cos^2\theta - 3\cos\theta + 1$

$0 = (2\cos\theta - 1)(\cos\theta - 1)$

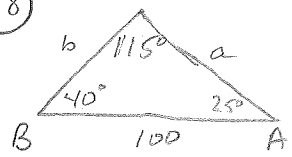
$\cos\theta = 1/2$ $\cos\theta = 1$

$\boxed{\theta = \frac{\pi}{3}, \frac{5\pi}{3}, 0}$

(56) 

$\boxed{67°}$

(57) $\frac{37\pi}{15}$ or $\frac{-23\pi}{15}$

(58) 

$\frac{\sin 25}{b} = \frac{\sin 115°}{100} = \frac{\sin 40}{a}$

$\boxed{a = 70.9\text{ ft} \quad b = 46.6\text{ ft}}$

(59) a. $B = 11.79°$, $C = 146.21°$, $c = 16.33$ cm

b. $A = 78.28°$, $B = 64.67°$, $C = 37.05°$

c. $c = 6.87$ cm, $A = 61.19°$, $B = 76.81°$

d. $C = 102°$, $b = 5.69$ cm, $c = 8.32$ cm

e. no Δ

f. $B_1 = 30.87°$, $C_1 = 129.13°$, $c_1 = 9.07$ mm

$B_2 = 149.13°$, $C_2 = 10.87°$, $c_2 = 2.20$ mm

(60) a. $A = 107.6\text{ m}^2$ b. 978.6 u^2

(61) a. $\begin{bmatrix} 3 & -27 & 12 \\ -9 & 4 & -2 \end{bmatrix}$ b. $\begin{bmatrix} 52 & -32 & 28 \\ -9 & 5 & -39 \end{bmatrix}$

(62) $(1, 0, -3)$ (63) yes! $AB = BA = I$

(64) a. No; infinite

b. no; @ $x = -1$ removeable

@ $x = -2$ infinite

(65) a. 4 b. 8 c. DNE

(66) a. 10 b. -12

c. 3 d. DNE