ACP PreCalculus Name_____
Final Exam Review Packet

Remember to change modes in your calculator and show all work.
All graphing problems should be completed in radian mode.

Section 5.1

Convert the angle to a decimal in degrees. Round the answer to two decimal places.

1) 65°44'30" 1) _____

Convert the angle to D° M' S'' form. Round the answer to the nearest second.

2) 81.96° 2) _____

If s denotes the length of the arc of a circle of radius r subtended by a central angle θ, find the missing quantity.

3) r = $\frac{2}{3}$ feet, s = 10 feet, θ = ? 3) _____

Solve the problem.

4) The minute hand of a clock is 4 inches long. How far does the tip of the minute hand move in 45 minutes? If necessary, round the answer to two decimal places. 4) _____

Convert the angle in degrees to radians. Express the answer as multiple of π.

5) 105° 5) _____

Convert the angle in radians to degrees.

6) $\frac{9\pi}{10}$ 6) _____

Convert the angle in radians to degrees. Express the answer in decimal form. If necessary, round to two decimal places.

7) $\sqrt{6}$ 7) _____

If A denotes the area of the sector of a circle of radius r formed by the central angle θ, find the missing quantity. If necessary, round the answer to two decimal places.

8) r = 13 inches, θ = 5 radians, A = ? 8) _____

9) θ = 45°, A = 86 square meters, r = ? 9) _____

Solve the problem.

10) The blade of a windshield wiper sweeps out an angle of 135° in one cycle. The base of the blade is 12 inches from the pivot point and the tip is 32 inches from the pivot point. What area does the wiper cover in one cycle? (Round to the nearest 0.1 square inch.) 10) _____

Section 5.2

In the problem, t is a real number and P = (x, y) is the point on the unit circle that corresponds to t. Find the exact value of the indicated trigonometric function of t.

11) $(\frac{2}{9}, \frac{\sqrt{77}}{9})$ Find tan t. 11) _____

12) $(\frac{4}{9}, -\frac{\sqrt{65}}{9})$ Find csc t. 12) _____

A point on the terminal side of an angle θ is given. Find the exact value of the indicated trigonometric function of θ.

13) (4, -5) Find cot θ. 13) _____

Find the exact value of the expression.

14) $\sin\frac{\pi}{3} - \cos\frac{\pi}{6}$ 14) _____

15) csc 60° - cos 45° 15) _____

16) $\cos\frac{20\pi}{3}$ 16) _____

17) cos 120° tan 60° 17) _____

Section 5.3

18) What is the domain of the sine function? 18) _____

19) For what numbers θ is f(θ) = tan θ not defined? 19) _____

20) What is the range of the cosine function? 20) _____

21) Determine the sign of the trigonometric values listed below. 21) _____
(i) sin 250°
(ii) tan 330°
(iii) cos(-40°)

Name the quadrant in which the angle θ lies.

22) $\cot\theta > 0, \quad \sin\theta < 0$ 22) _____

Use the fact that the trigonometric functions are periodic to find the exact value of the expression.

23) sin 405° 23) _____

24) $\cos\frac{10\pi}{3}$ 24) _____

Find the exact value of the indicated trigonometric function of θ.

25) $\sin\theta = \frac{\sqrt{5}}{3}, \cos\theta = \frac{2}{3}$ Find $\cot\theta$. 25) _____

26) $\tan\theta = -\frac{10}{7}$, θ in quadrant II Find $\cos\theta$. 26) _____

27) $\sec\theta = \frac{9}{4}$, θ in quadrant IV Find $\tan\theta$. 27) _____

Use the properties of the trigonometric functions to find the exact value of the expression.

28) $\sin^2 80° + \cos^2 80°$ 28) _____

29) $\sec^2 80° - \tan^2 80°$ 29) _____

30) $\tan 70° - \frac{\sin 70°}{\cos 70°}$ 30) _____

Use the even-odd properties to find the exact value of the expression.

31) cos (-60°) 31) _____

32) $\sin\left(-\frac{\pi}{4}\right)$ 32) _____

Section 5.4

Without graphing the function, determine its amplitude or period as requested.

33) $y = -4 \sin x$ Find the amplitude. 33) _____

34) $y = \cos 3x$ Find the period. 34) _____

35) $y = \frac{5}{6} \cos\left(-\frac{8\pi}{7}x\right)$ Find the period. 35) _____

Section 5.6

Find the phase shift of the function.

36) $y = 5 \cos(6x + \pi)$ 36) _____

Solve the problem.

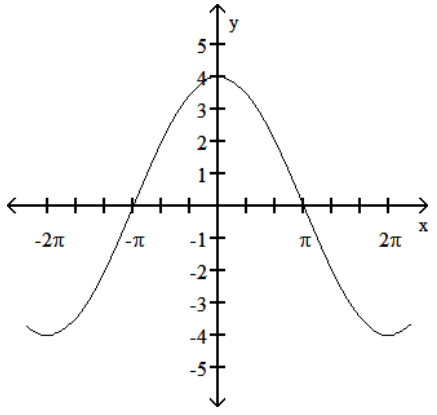
37) For the equation $y = -\frac{1}{2} \cos(2x - 2\pi)$, identify (i) the amplitude, (ii) the phase shift, and (iii) the period. 37) _____

Write the equation of a sine function that has the given characteristics.

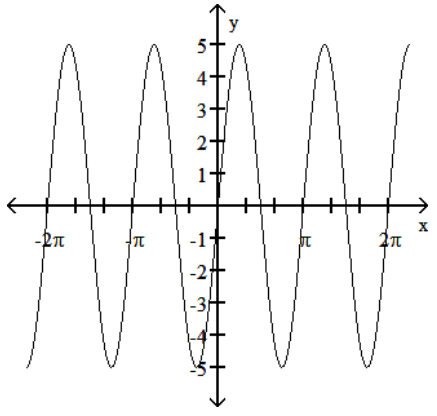
38) Amplitude: 3
Period: 6π 38) _____

39) Amplitude: 3
Period: 4π
Phase Shift: $\frac{\pi}{4}$ 39) _____

Find an equation for the graph.

40) 

40) _____

41) 

41) _____

Sections 6.1 and 6.2

Find the exact value of the expression.

42) $\tan^{-1}(-1)$ 42) _____

43) $\sin^{-1}(0.5)$ 43) _____

44) $\csc^{-1}(2)$ 44) _____

45) $\sin(\tan^{-1} 2)$ 45) _____

46) $\cos[\cos^{-1}(-0.9372)]$ 46) _____

47) $\cos\left(\sin^{-1}\frac{3}{5}\right)$ 47) _____

Use a calculator to find the value of the expression rounded to two decimal places.

48) $\cos^{-1}(-0.9)$ 48) _____

49) $\sin^{-1}\left(\frac{\sqrt{6}}{3}\right)$ 49) _____

50) $\sec^{-1}\left(\frac{7}{4}\right)$ 50) _____

51) $\sin^{-1}\left(\frac{\sqrt{7}}{3}\right)$ 51) _____

Find the exact value of the expression.

52) $\tan\left(\cos^{-1}\frac{1}{3}\right)$ 52) _____

Section 6.3

Simplify the trigonometric expression by following the indicated direction.

53) Rewrite over a common denominator: $\frac{1}{1 - \cos\theta} + \frac{1}{1 + \cos\theta}$ 53) _____

54) Factor and simplify: $\frac{6\cos^2\theta + 7\cos\theta + 1}{\cos^2\theta - 1}$ 54) _____

Simplify the expression as far as possible.

55) $\frac{\cos\theta}{1 + \sin\theta} + \tan\theta$ 55) _____

Complete the identity.

56) $\frac{\sin\theta}{1+\sin\theta} - \frac{\sin\theta}{1-\sin\theta} = ?$ 56) _____

57) $\frac{(\sin\theta+\cos\theta)^2}{1+2\sin\theta\cos\theta} = ?$ 57) _____

58) $\cos\theta - \cos\theta\sin^2\theta = ?$ 58) _____

59) $\sec^4\theta + \sec^2\theta\tan^2\theta - 2\tan^4\theta = ?$ 59) _____

60) $\frac{\csc\theta(\sin^2\theta+\cos^2\theta\tan\theta)}{\sin\theta+\cos\theta} = ?$ 60) _____

Section 6.4

Use Sum and Difference Formulas to find the exact value of the trigonometric function.

61) $\cos \frac{5\pi}{12}$ 61) _____

62) $\tan 345°$ 62) _____

Find the exact value of the expression.

63) $\sin 25° \cos 35° + \cos 25° \sin 35°$ 63) _____

64) $\frac{\tan 70° + \tan 80°}{1 - \tan 70° \tan 80°}$ 64) _____

Complete the identity.

65) $\cos\left(\frac{\pi}{2} + \theta\right) = ?$ 65) _____

66) $\frac{\cos(\alpha - \beta)}{\sin \alpha \cos \beta} = ?$ 66) _____

Find the exact value under the given conditions.

67) $\sin\alpha = \frac{4}{5},\ \frac{\pi}{2} < \alpha < \pi;\quad \cos\beta = \frac{2}{5},\ 0 < \beta < \frac{\pi}{2}$ Find $\cos(\alpha - \beta)$. 67) _____

68) $\tan\alpha = \frac{3}{4},\ \pi < \alpha < \frac{3\pi}{2};\quad \cos\beta = -\frac{24}{25},\ \frac{\pi}{2} < \beta < \pi$ Find $\sin(\alpha + \beta)$. 68) _____

Find the exact value of the expression.

69) $\tan\left(\tan^{-1}\frac{3}{4} + \sin^{-1}\frac{1}{2}\right)$ 69) _____

Section 6.5

Use Double-Angle Formulas to find the exact value of the indicated trigonometric function over the i $0 \le \theta \le 2\pi$.

70) $\csc\theta = -\frac{3}{2},\ \tan\theta > 0$ Find $\cos(2\theta)$. 70) _____

71) $\sin\theta = \frac{4\sqrt{3}}{7},\ \tan\theta < 0$ Find $\sin(2\theta)$. 71) _____

Solve the equation on the interval $0 \le \theta < 2\pi$.

72) $\sqrt{2} \cos(2\theta) = 1$ 72) _____

73) $2 \cos \theta + 1 = 0$ 73) _____

Use a calculator to solve the equation on the interval $0 \le \theta < 2\pi$. Round the answer to two decimal places.

74) $\cos \theta = 0.57$ 74) _____

Using a graphing utility, solve the equation on the interval $0 \le \theta < 2\pi$. Round answer to two decimal places.

75) $2 \csc \theta = 5$ 75) _____

Solve the equation on the interval $0 \le \theta < 2\pi$.

76) $2 \sin^2 \theta = \sin \theta$ 76) _____

77) $\cos \theta = \sin \theta$ 77) _____

78) $\sin(2\theta) + \sin \theta = 0$ 78) _____

Use a graphing utility to solve the equation on the interval $0° \le x < 360°$. Express the solution(s) rounded to one decimal place.

79) $3 \cos^2 x + 2 \cos x = 1$ 79) _____

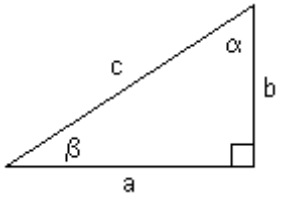
80) $2 + 13 \sin x = 14 \cos^2 x$ 80) _____

Section 7.1

Two sides of a right triangle ABC (C is the right angle) are given. Find the indicated trigonometric function .

81) Find sin B when b = 6 and c = 7. 81) _____

Solve the right triangle using the information given. Round answers to two decimal places, if necessary.



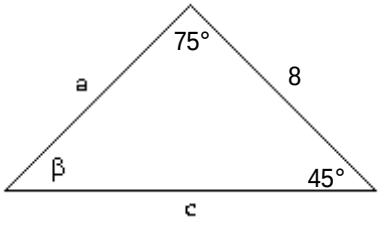
82) b = 8, α = 25°; find a, c, and β 82) _____

Use the Complementary Angle Theorem to find the exact value of the expression.

83) $-\dfrac{\sec 60°}{\csc 30°}$ 83) _____

Sections 7.2 , 7.3 and 7.4
Solve the triangle.

84) 84) _____

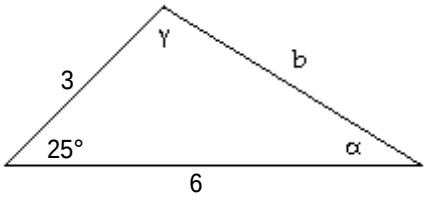


85) α = 40°, β = 80°, a = 5 85) _____

Two sides and an angle are given. Determine whether the given information results in one triangle, two triangles, or no triangle at all. Solve any triangle(s) that results.

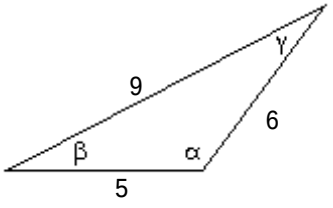
86) a = 33, b = 17, β = 15° 86) _____

Solve the triangle.

87) 

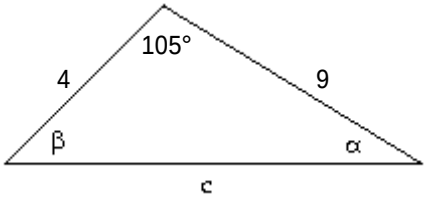
87) _____

Solve the triangle. Find the angles α and β first.

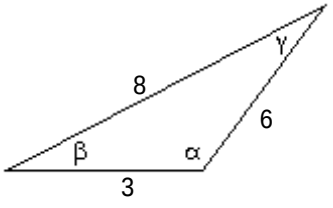
88) 

88) _____

Find the area of the triangle. If necessary, round the answer to two decimal places.

89) 

89) _____

90) 

90) _____

Chapter 7 Applied Problems

Show ALL work and solve each problem.

91) A building 180 feet tall casts a 70 foot long shadow. If a person looks down from the top of the building, what is the measure of the angle between the end of the shadow and the vertical side of the building (to the nearest degree)? (Assume the person's eyes are level witl the top of the building.)

91) _____

92) A radio transmission tower is 170 feet tall. How long should a guy wire be if it is to be attached 8 feet from the top and is to make an angle of 29° with the ground? Give your answer to the nearest tenth of a foot. 92) _____

93) An airplane is sighted at the same time by two ground observers who are 5 miles apart and both directly west of the airplane. They report the angles of elevation as 13° and 22°. How high is the airplane? 93) _____

94) A ship at sea, the Admiral, spots two other ships, the Barstow and the Cauldrew and measures the angle between them at be 45°. They radio the Barstow and by comparing known landmarks, the distance between the the Admiral and the Barstow is found to be 323 meters. The Barstow reports an angle of 59° between the Admiral and the Cauldrew. To the nearest meter, what is the distance between the Barstow and the Cauldrew? 94) _____

95) In flying the 84 miles from Champaign to Peoria, a student pilot sets a heading that is 12° off course and maintains an average speed of 136 miles per hour. After 15 minutes, the instructor notices the course error and tells the student to correct his heading. Through what angle will the plane move to correct the heading and how many miles away is Peoria when the plane turns? 95) _____

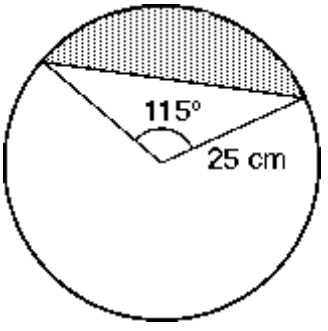
96) A famous golfer tees off on a long, straight 478 yard par 4 and slices his drive 18° to the right of the line from tee to the hole. If the drive went 274 yards, how many yards will the golfer's second shot have to be to reach the hole? 96) _____

97) A ladder leans against a building that has a wall slanting away from the ladder at an angle of 96° with the ground. If the bottom of the ladder is 23 feet from the base of the wall and it reaches a point 52 feet up the wall, how tall is the ladder to the nearest foot? 97) _____

98) A room in the shape of a triangle has sides of length 6 yd, 10 yd, and 14 yd. If carpeting costs $14.50 a square yard and padding costs $4.25 a square yard, how much to the nearest dollar will it cost to carpet the room, assuming that there is no waste? 98) _____

99) A new homeowner has a triangular-shaped back yard. Two of the three sides measure 65 ft and 80 ft and form an included angle of 125°. The owner wants to approximate the area of the yard, so that he can determine the amount of fertilizer and grass seed to be purchased. Find the area of the yard rounded to the nearest square foot. 99) _____

100) Find the area of the shaded portion (see illustration) of a circle of radius 25 cm, formed by a central angle of 115°. Round your answer to the nearest square cm. 100) _____



[Hint: Subtract the area of the triangle from the area of the sector of the circle to obtain the area of the shaded portion.]