

SALT LAKE COMMUNITY COLLEGE  
MATH 1060 - TRIGONOMETRY  
FINAL EXAMINATION

Fall 2006

Name \_\_\_\_\_

This exam is in three parts. Carefully read the instructions for each part. All problems are equal in point value.

The exam is closed book with no notes or formula sheets allowed.

In the directions when it says "exact value" a calculator should not be used.

**PART I. MULTIPLE CHOICE. Circle the correct response. Solve all problems in this section. No partial credit will be given.**

Given a **RIGHT triangle** ( $\gamma$  is the right angle), give an exact answer with rational denominator for the following:

1) Find  $\sec \beta$  when  $a = 9$  and  $b = 8$ .

A)  $\frac{9\sqrt{145}}{145}$

B)  $\frac{8\sqrt{145}}{145}$

C)  $\frac{\sqrt{145}}{9}$

D)  $\frac{9\sqrt{145}}{8}$

Find the exact value of the expression. Do not use a calculator.

2)  $\tan\left(\frac{15\pi}{4}\right) - \cos\left(\frac{15\pi}{4}\right)$

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

B)  $\frac{-2 + \sqrt{2}}{2}$

C)  $\frac{-2 - \sqrt{2}}{2}$

D)  $\frac{2 - \sqrt{2}}{2}$

**Solve the problem.**

3) A twenty-five foot ladder just reaches the top of a house and forms an angle of  $41.5^\circ$  with the wall of the house. How tall is the house? Round your answer to the nearest 0.1 foot.

A) 18.7 ft

B) 18.8 ft

C) 19 ft

D) 18.6 ft

4) For what numbers  $x$ ,  $-2\pi \leq x \leq 2\pi$ , does  $\csc x = -1$ ?

A)  $-2\pi, 0, 2\pi$

B)  $-\frac{\pi}{2}, \frac{3\pi}{2}$

C)  $-\pi, \pi$

D) none

**Find the exact value of the trigonometric function.**

5)  $\tan 345^\circ$

A)  $\frac{2 - \sqrt{3}}{4}$

B)  $\frac{2 + \sqrt{3}}{4}$

C)  $-2 + \sqrt{3}$

D)  $2 + \sqrt{3}$

Find the exact value of the expression.

6)  $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

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

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

C)  $\frac{2\pi}{3}$

D)  $\frac{5\pi}{6}$

The rectangular coordinates of a point are given. Find polar coordinates for the point.

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

A)  $(2, -\frac{\pi}{6})$

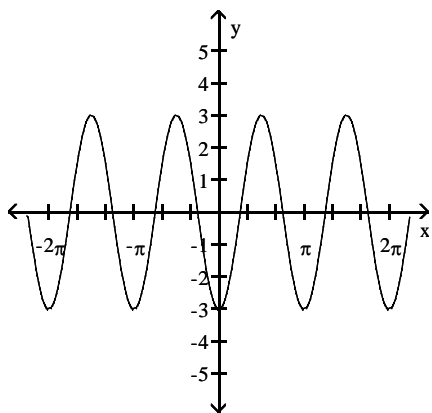
B)  $(2, -\frac{5\pi}{6})$

C)  $(2, \frac{5\pi}{6})$

D)  $(2, \frac{\pi}{6})$

Find an equation for the graph.

8)



A)  $y = -3 \cos(2x)$

B)  $y = -3 \sin(2x)$

C)  $y = -3 \cos\left(\frac{1}{2}x\right)$

D)  $y = -3 \sin\left(\frac{1}{2}x\right)$

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

9)  $\theta = 4$  radians,  $A = 73$  square meters,  $r = ?$

A) 12.08 m

B) 6.04 m

C) 146 m

D) 584 m

Solve the problem.

10) Which of the following vectors is orthogonal to  $20\mathbf{i} - 8\mathbf{j}$ ?

A)  $4\mathbf{i} + 3\mathbf{j}$

B)  $20\mathbf{i} + 4\mathbf{j}$

C)  $15\mathbf{i} - 6\mathbf{j}$

D)  $-10\mathbf{i} - 25\mathbf{j}$

Find the exact value of the expression. Do not use a calculator.

11)  $\sin [\sin^{-1} (-0.6)]$

A) -1.6667

B) -0.6

C) -0.4

D) -1.771

The displacement  $d$  (in meters) of an object at time  $t$  (in seconds) is given. Describe the motion of the object. What is the maximum displacement from its resting position, the time required for one oscillation, and the frequency?

12)  $d = 3 \cos(5t)$

- A) simple harmonic; 3 m;  $\frac{2}{5} \pi$  sec;  $\frac{5}{2\pi}$  oscillations/sec
- B) simple harmonic; -3 m;  $\frac{2}{5} \pi$  sec;  $\frac{5}{2\pi}$  oscillations/sec
- C) simple harmonic; 3 m;  $\frac{5}{2\pi}$  sec;  $\frac{2}{5} \pi$  oscillations/sec
- D) simple harmonic; 3 m;  $5 \pi$  sec;  $\frac{5}{\pi}$  oscillations/sec

**PART II. Work all problems in this section. SHOW ALL WORK!. Partial credit will be given. FULL CREDIT MAY NOT BE GIVEN IF APPROPRIATE WORK IS NOT SHOWN.**

Find the exact value of the indicated trigonometric function of  $\theta$ .

13)  $\sec \theta = \frac{9}{8}$ ,  $\theta$  in quadrant IV Find  $\tan \theta$ .

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

14)  $\alpha = 83^\circ$ ,  $b = 9$ ,  $c = 6$

**Establish the identity.**

$$15) \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} = \sec \theta \csc \theta$$

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

16) Amplitude: 4

Period:  $\pi$

Phase Shift:  $\frac{5}{2}$

**Establish the identity.**

$$17) \tan \theta (\cot \theta - \cos \theta) = 1 - \sin \theta$$

Use the definition or identities to find the exact value of the other five trigonometric functions of the acute angle  $\theta$ .

$$18) \cos \theta = \frac{5}{13}$$

$$\sin \theta =$$

$$\cot \theta =$$

$$\tan \theta =$$

$$\sec \theta =$$

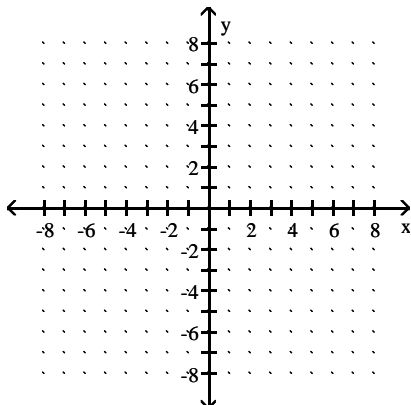
$$\csc \theta =$$

Solve the problem correct to one decimal point.

- 19) The distance from home plate to a point C in center field in a certain baseball stadium is 406 feet. Second base is located on a straight line segment from home plate to point C. A baseball diamond is a square with a distance from home plate to first base of 90 feet. How far is it from first base to point C?

Graph the curve whose parametric equations are given. Be sure to show orientation. Either show a table of values or remove the parameter, or both.

$$20) x = 2t - 1, y = t^2 - 5; \quad -2 \leq t \leq 2$$

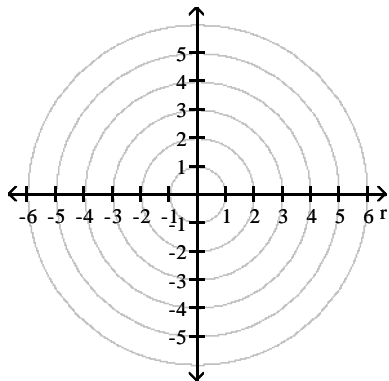


**Solve the triangle.**

21)  $\beta = 10^\circ$ ,  $\gamma = 20^\circ$ ,  $b = 4$

**Identify and graph the equation. Transform the polar equation to an equation in rectangular coordinates. Show all work.**

22)  $r = 6 \sin \theta$



**PART III. Choose 4 of the following 8 problems to work. CROSS OUT any problems you do not want graded. The first 4 problems that show work that are not crossed out will be the problems that are graded for this section. SHOW ALL WORK! Partial credit will be given. Full credit may not be given if appropriate work is not shown.**

Given the complex numbers  $z$  and  $w$ , find  $zw$ . Give answer in polar form  $r(\cos \theta + i \sin \theta)$  with angle in degrees.

23)

$$z = 3 - 3i, \quad w = \sqrt{3} + i$$

**Find the exact value under the given conditions.**

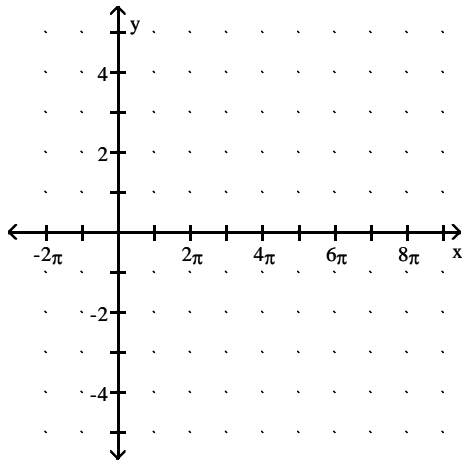
$$24) \cos \alpha = -\frac{4}{5}, \frac{\pi}{2} < \alpha < \pi; \quad \sin \beta = -\frac{\sqrt{21}}{5}, \pi < \beta < \frac{3\pi}{2} \quad \text{Find } \cos(\alpha + \beta).$$

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

$$25) \sin(2\theta) + \sin \theta = 0$$

Graph the function clearly labeling and showing any vertical asymptotes. Show at least 1 complete period.

$$26) y = 3 \sec\left(\frac{1}{3}x\right)$$



Establish the identity.

$$27) 2 \tan \theta - (1 + \tan \theta)^2 = - \sec^2 \theta$$

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.

$$28) b = 6, \quad c = 7, \quad \beta = 70^\circ$$

Use DeMoivre's Theorem. Show all work. Give your result in the standard form  $a + bi$ . DO NOT USE A CALCULATOR.

29)  $(-\sqrt{3} + i)^6$

**Draw and label a diagram. Then solve the problem.**

- 30) A ship at sea, the Admiral, spots two other ships, the Barstow and the Cauldrew and measures the angle between them at be  $45^\circ$ . 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  $59^\circ$  between the Admiral and the Cauldrew. To the nearest meter, what is the distance between the Barstow and the Cauldrew?