

# Math 1060 Final Exam A Part 1 Fall 2012

Name: \_\_\_\_\_



Instructor: \_\_\_\_\_

Answer all of questions 1-18. No books, notes, cell phones, calculators or any other electronic devices are allowed. Write down all necessary steps and answers legibly to earn full credit. Students are not allowed to have Part 1 back after submitting it. Do it by yourself.

1. Find the exact value of each of the following or state that it is undefined.

a)  $\tan 30^\circ =$

b)  $\csc 240^\circ =$

c)  $\cot 180^\circ =$

d)  $\sec \frac{15\pi}{4} =$

e)  $\cos\left(-\frac{2\pi}{3}\right) =$

f)  $\sin\left(-\frac{\pi}{4}\right) =$

2. Consider the function  $y = 2 \cos\left(\frac{\pi x}{4} + \frac{\pi}{2}\right)$ .

a) Find the phase shift.

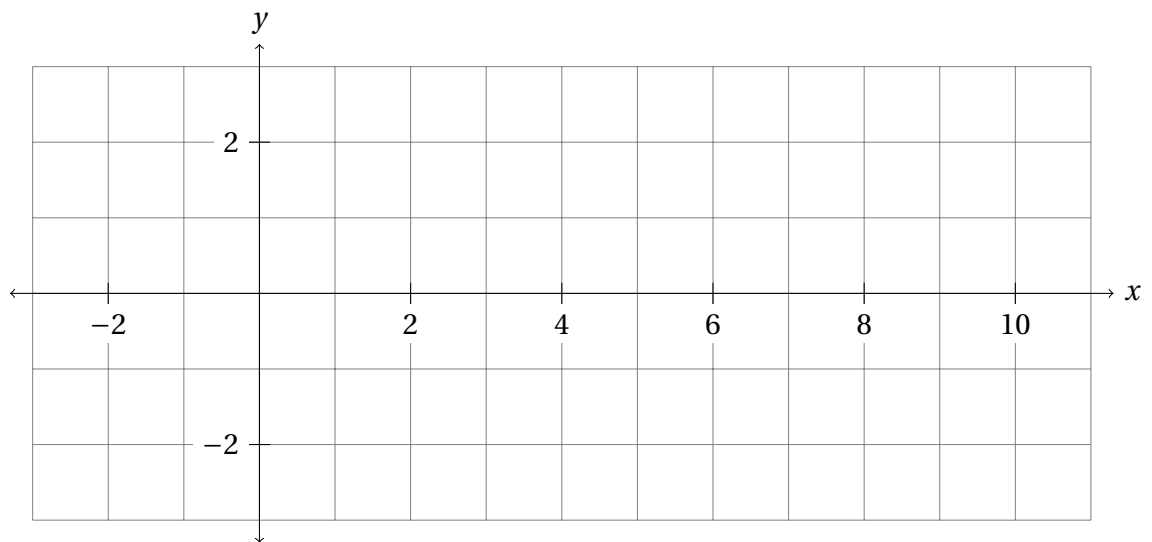
b) Find the period.

c) Find the frequency.

d) Find the amplitude.

e) Find the range.

f) Graph the function and give the coordinates of the five key points on the graph.



3. a) Complete the formula.  $\cos(\alpha - \beta) =$

b) Use the formula from a) to find the exact value.

$$\cos\left(\frac{\pi}{12}\right) =$$

4. Find all exact real numbers in radians in the interval  $[0, 2\pi)$  that satisfy the equation.  $2 \sin(2x) - \sqrt{3} = 0$

5. Evaluate each expression.

a)  $\cos^{-1}\left(-\frac{1}{2}\right) =$

b)  $\tan\left(\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right) =$

6. Find an equivalent algebraic expression for the composition.  
 $\sec(\sin^{-1} x)$

7. Prove that the equation is an identity.

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

# Math 1060 Final Exam A Part 2 Fall 2012

Name: \_\_\_\_\_



Instructor: \_\_\_\_\_

Answer all questions 8 - 15. Students must submit Part 1 before starting Part 2. You may use scientific or approved graphing calculators. No books, notes, cell phones, or any other electronic devices are allowed. Write down all necessary steps and answers legibly to earn full credit. Do it by yourself.

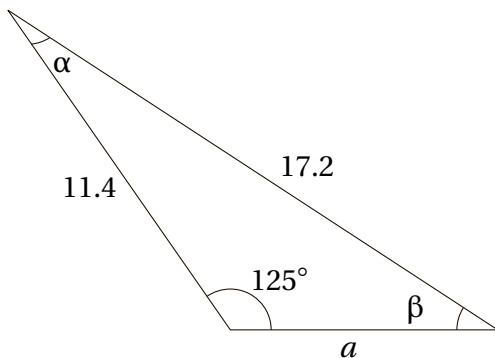
8. Use the vectors  $\mathbf{u} = \langle -4, 5 \rangle$  and  $\mathbf{v} = \langle 6, -7 \rangle$  and write answers in the form  $\langle a, b \rangle$ .

a) Find  $2\mathbf{u} - \mathbf{v}$ .

b) Find  $|\mathbf{v}|$ .

c) Find  $\mathbf{u} \cdot \mathbf{v}$ .

9. Solve the triangle. Round answers to the nearest tenth.



10. Suppose the tip of a lawnmower blade of radius 11 inches long is spinning 2,700 rev/min. Find the linear velocity in miles per hour. Round to the nearest tenth. Given that 1 mile = 5,280 feet.

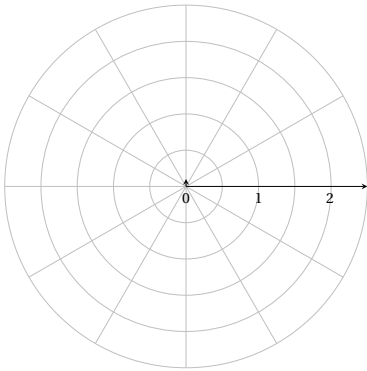
11. a) Write the complex number  $(-1 - 2i)$  in trigonometric form. Write your answer in degrees rounded to the nearest tenth.

b) Use De Moivre's theorem to find  $(-1 - 2i)^6$ . Write your answer in the form  $a + bi$ .

12. Find the area of a triangle with the lengths of the sides 220 m, 234 m, and 160 m. Round to the nearest integer.

13. If a force of 150 pounds is required to push a piano up a ramp that is inclined  $25^\circ$ , then what is the weight of the piano? You must draw a sketch to show the given situation. Round to the nearest integer.

14. Graph the polar equation  $r = 2 \cos 2\theta$ . State at least four exact  $(r, \theta)$  points on the graph.



15. Assume  $a = 7$ ,  $b = 9$ , and  $c = 12$ . Solve the triangle. Round to the nearest tenth.

# Math 1060 Final Exam A Part 3 Fall 2012



Choose five questions out of questions 16 - 22 to answer. Cross out questions that you do not want to be graded.

You may use scientific or approved graphing calculators. No books, notes, cell phones, or any other electronic devices are allowed. Write down all necessary steps and answers legibly to earn full credit. Do it by yourself.

16. Prove that the equation is an identity.  $\sin 3x = \sin x (3 \cos^2 x - \sin^2 x)$

17. Multiply.  $3(\cos 20^\circ + i \sin 20^\circ) \cdot 2(\cos 25^\circ + i \sin 25^\circ)$   
Give the exact answer in the form  $a + bi$ .



18. Find all of the fourth roots of  $-8 + 8i\sqrt{3}$ . Write your answers as  $r(\cos\theta + i\sin\theta)$ .

19. The hour hand of a clock is 5 inches long. Find the distance in inches that the tip will move in 10 hours. Give an exact answer.

20. Eliminate the parameter and identify the graph of the pair of parametric equations:  
 $x = 2 \sin t \cos t$  and  $y = \frac{1}{3} \cdot \sin 2t$

21. Two prospectors are pulling on ropes attached around the neck of a donkey that does not want to move. One prospector pulls with a force of 55 lb, and the other pulls with a force of 80 lb. If the angle between the ropes is  $25^\circ$ , how much force must the donkey use in order to stay put? (Assume the donkey knows the proper direction in which to apply his force.) You must draw a sketch to show the given situation. Round to the nearest tenth.

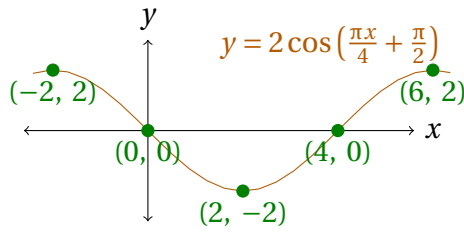
22. The radius of each of the tires on Shane's car is 14 inches long. Find the angular velocity in radians per hour of a point on the outside edge of a tire when his car is going 65 miles per hour. Round to the nearest tenth. Given that 1 mile = 5,280 feet.

# Math 1060 Final Exam A Answers Fall 2012



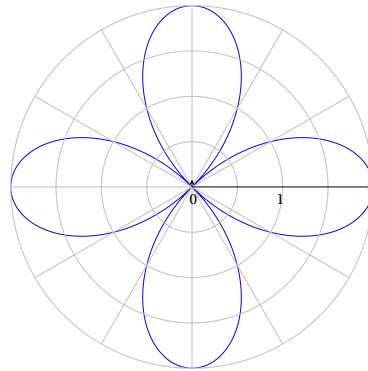
Mathematics Department

1. a)  $\frac{1}{\sqrt{3}}$   
 b)  $\frac{-2}{\sqrt{3}}$   
 c) Undefined.  
 d)  $\sqrt{2}$   
 e)  $\frac{-1}{2}$   
 f)  $\frac{-1}{\sqrt{2}}$
2. a)  $-2$   
 b)  $8$   
 c)  $\frac{1}{8}$   
 d)  $2$   
 e)  $[-2, 2]$



3. a)  $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$   
 b)  $\frac{1+\sqrt{3}}{2\sqrt{2}}$
4.  $\frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}$
5. a)  $\frac{2\pi}{3}$  or  $120^\circ$   
 b)  $-\sqrt{3}$
6.  $\frac{1}{\sqrt{1-x^2}}$
7. It is a proof.
8. a)  $< -14, 17 >$

- b)  $\sqrt{85}$   
 c)  $-59$
9.  $\alpha \sim 22.1^\circ, a \sim 7.9, \beta \sim 32.9^\circ$
10. 176.7 miles/h
11. a)  $\sqrt{5}(\cos 243.4^\circ + \sin 243.4^\circ)$   
 b)  $117 + 44i$
12. 16,930 m<sup>2</sup>
13. 355 pound



- 14.
15.  $\alpha \sim 35.4^\circ, \beta \sim 48.2^\circ, \gamma \sim 96.4^\circ$
16. It is a proof.
17.  $3\sqrt{2} + 3i\sqrt{2}$
18.  $2 \operatorname{cis} 30^\circ, 2 \operatorname{cis} 120^\circ,$   
 $2 \operatorname{cis} 210^\circ,$  and  $2 \operatorname{cis} 300^\circ$
19.  $\frac{25}{3}\pi$  in
20.  $y = \frac{x}{3}$
21. 131.9 lb
22. 294,171.4 rad./h