MATH 1120 UNIFORM FINAL EXAM

Dec. 6th, 2008

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Name: ______________________________

Student Number: ______________________________

Circle Your Section and Instructor:

001	002	003
Yim Thipwiwpotjana T/TH 4:00-5:15	Eric Sullivan T/TH 10:00-11:15	Cameron Douthitt M/W 1:00-2:15

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Directions:

1. Complete the Section Above.
2. Put your name on page 1 of the test. You should have 8 pages of test questions.
3. This exam is closed calculator, closed note, and closed book.
4. If you are confused about what a problem is asking, ask your instructor. You may not ask for hints or verification on how you have completed a problem.

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Page 1	Page 2	Page 3	Page 4
29	18	13	16
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20	16	19	19

Total: ____________________ (Out of 150 Points)

Name : ______________________________ **Date:** ____________

1. (18 pts.) Find the exact value of each expression. Write your final answer in the space provided.

a) $\sin(\frac{-2\pi}{3})$ ________________

d) $\csc(300^\circ)$ ________________

b) $\sin^{-1}(-\frac{\sqrt{3}}{2})$ ________________

e) $\sec(\frac{11\pi}{4})$ ________________

c) $\cos(\frac{7\pi}{6})$ ________________

f) $\tan(\frac{5\pi}{6})$ ________________

2. (3 pts) Convert the angle whose measure is 110° to radians. Simplify your answer.

3. (6 pts.) The terminal side of angle θ passes through $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$. Find the exact value of each trigonometric function of θ.

$\cos(\theta) =$

$\csc(\theta) =$

$\tan(\theta) =$

4. (2 pts.) If $\tan(\theta) > 0$ and $\sec(\theta) < 0$, then θ lies in Quadrant ____________.

5. (4 pts. each). If $\cos\alpha = \frac{1}{2}$, $-\frac{\pi}{2} < \alpha < 0$, $\sin\beta = \frac{1}{3}$, $0 < \beta < \frac{\pi}{2}$, find the exact value of:

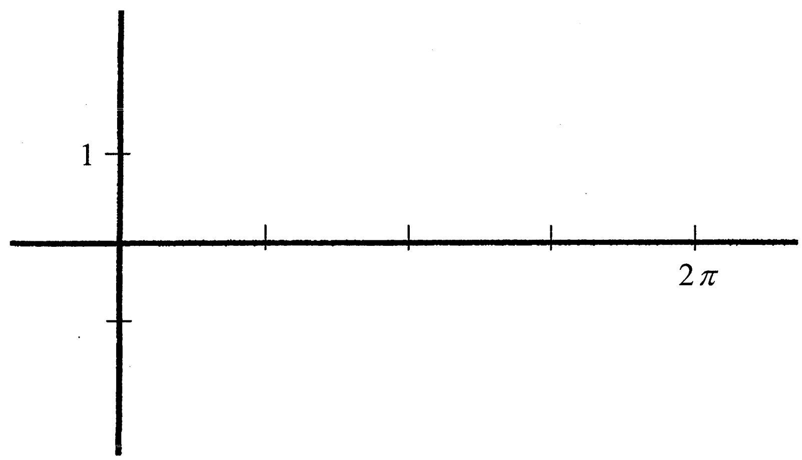
a. $\cos(\alpha - \beta) =$ ____________________

b. $\sin(2\beta) =$ ____________________

6. (6 pts.) Sketch the graph of $y = \sec(x)$ on the interval $[0, 2\pi]$. Show asymptotes with dotted lines. State the domain and range.

Domain: ________________

Range: ________________

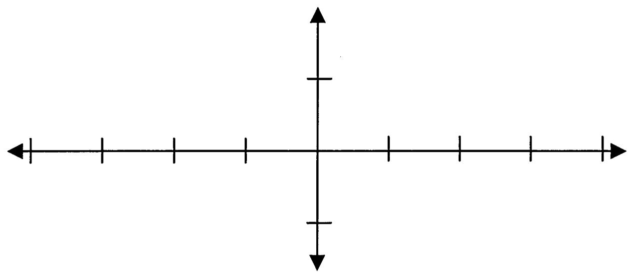


7. (4 pts.) Find the exact value of $\cos(165^\circ)$ and place your answer in the blank provided.

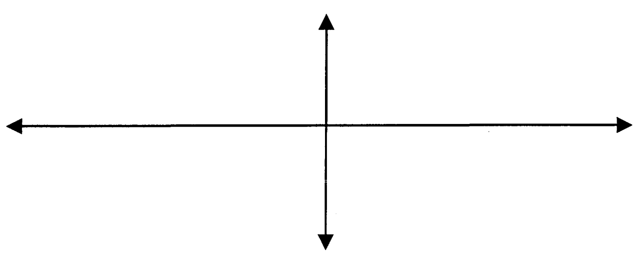
$\cos(165^\circ) =$ ______________________

8.

a. (2 pt.) Sketch the graph of **f(x) = sin(x)** on $[-2\pi, 2\pi]$.



b. (4 pts.) The inverse of $f(x)$ is $f^{-1}(x) = \sin^{-1}(x)$. Sketch the graph of f^{-1} and state the **domain** and **range**.



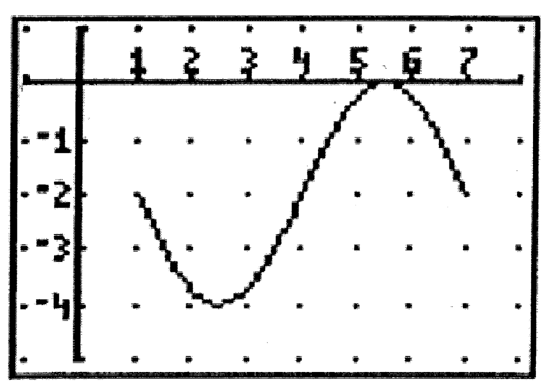
Domain: ____________________

Range: ____________________

c. (2 pts.) Find: $\sin^{-1}(-1) =$ ________________

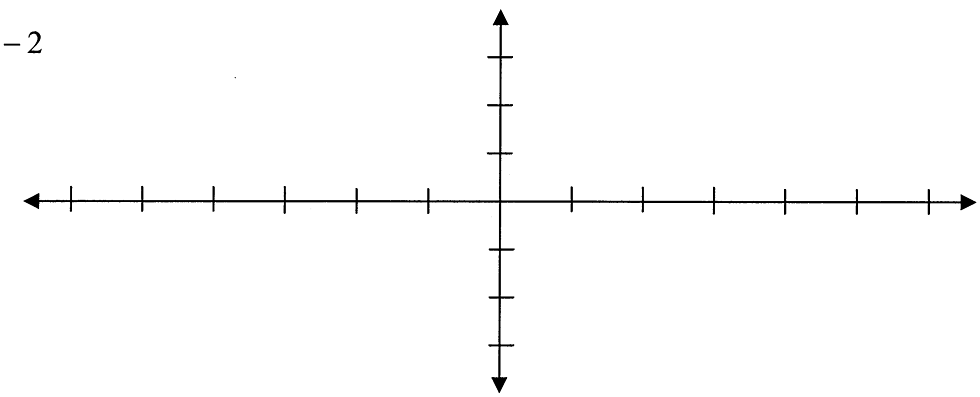
9. (5 pts.) One period of a trig function is shown below. Write an equation for the function.

y = ______________________



10. (6 pts. Each) Sketch the graph (at least one period) of each function below and state the amplitude, period, phase shift, and vertical shift. Label the important values on the axes.

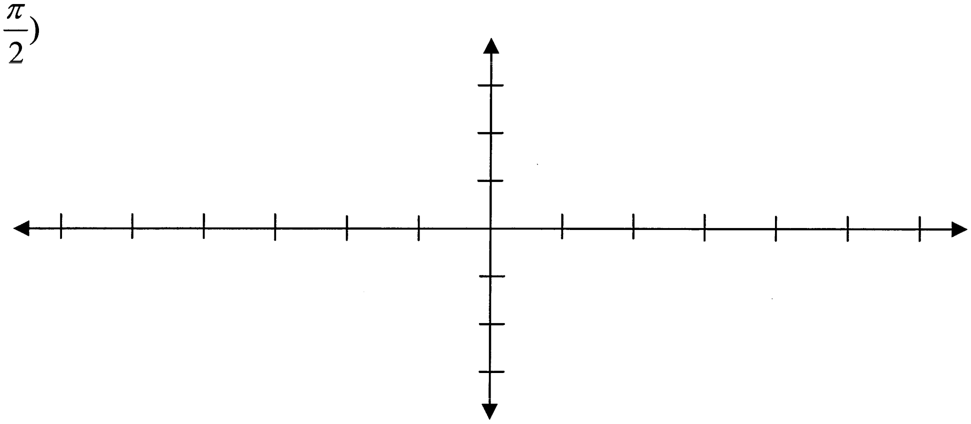
a. $y = -3\cos(x) - 2$



Amplitude: ____________________ Period: ____________________

Phase Shift: ____________________ Vertical Shift: ____________________

b) $y = 3\sin(2x + \frac{\pi}{2})$



Amplitude: ____________________ Period: ____________________

Phase Shift: ____________________ Vertical Shift: ____________________

11. (4 points) Write the equation of a sinusoidal function with the following characteristics:

Amplitude: 2 Period: 3 Phase Shift: $\frac{1}{2}$ Vertical Shift: 6

____

12. (5 pts. each). Prove the following identities. Show all steps.

a) $\cos\theta(\tan\theta + \cot\theta) = \csc\theta$

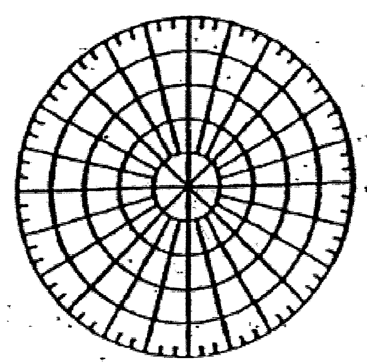
b. $1 - \dfrac{\cos^2\theta}{1+\sin\theta} = \sin\theta$

13. (4 pts.) Solve the following trigonometric equation on the interval $[0,\ 2\pi\ ]$. Show your work.

$\cos(2\theta) = -\dfrac{1}{2}$ $\theta =$ ________________________

14. Given the point $(-2, \dfrac{7\pi}{6})$ in polar coordinates.

a. (2 pts.) Plot the point on the polar grid provided.



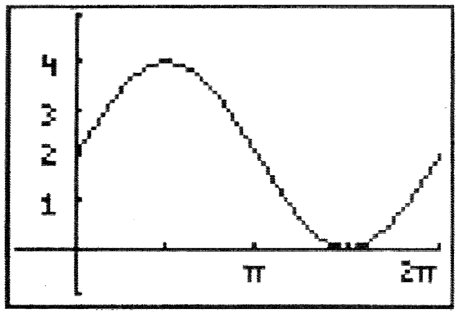
b. (2 pts.) Find other polar coordinates $(r,\ \theta)$ of the point for which $r > 0$ and $0 < \theta < 2\pi$.

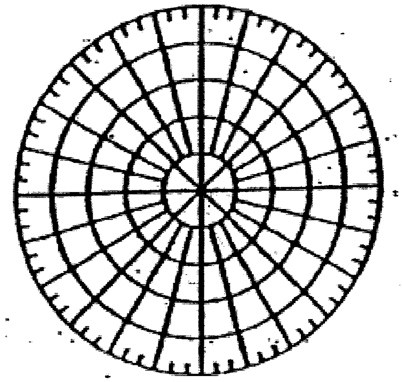
(_________, _________)

c. (2 pts.) Find the rectangular coordinates of the point.

(_________, _________)

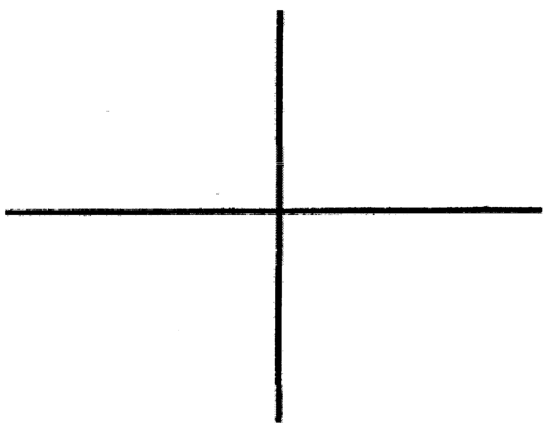
15. (4 pts.) Given the polar equation $r = 2 + 2\sin(\theta)$ and its corresponding graph in rectangular form. Sketch a graph of the grid in polar coordinates.





16. Given the complex number $1 - \sqrt{3}i$,

a. (1 pt.) Plot the complex number in the complex number plane.



b. (3 pts.) Write the complex number in polar form.

17. Given the complex number in polar form $z = 4(\cos\frac{7\pi}{4} + i\sin\frac{7\pi}{4})$

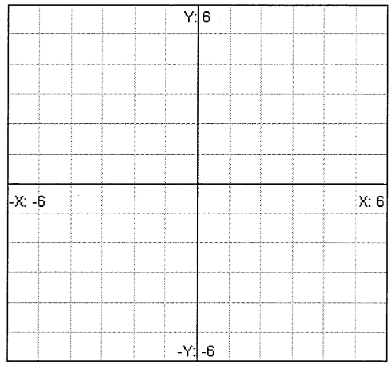
(4pts.) a. Write z in rectangular form.

(4 pts.) b. Calculate z^3. Simplify your answer and leave in polar form.

$z^3 =$ ______________________

18. Given the following set of parametric equations: $x = t - 3$, $y = 2t + 4$, $0 \le t \le 2$

a) (2 points) Graph the curve whose parametric equations are given by hand and show its orientation. (You may change the scale on the coordinate grid if so desired).



b) (2 points). Find the rectangular equation of the curve.

19. (4 pts. each). Write the first 4 terms of the sequences defined as:

a. $\left\{ \dfrac{(-1)^n}{(n+1)(n+2)} \right\}$ ________, ________, ________, ________

b. $a_1 = 3$, $a_n = \dfrac{a_{n-1}}{n}$ ________, ________, ________, ________

20. (4 pts.) Write a rule for the nth term of the sequence that begins, $1, \frac{1}{2}, 3, \frac{1}{4}, 5, \frac{1}{6}, 7, \frac{1}{8}, \ldots$

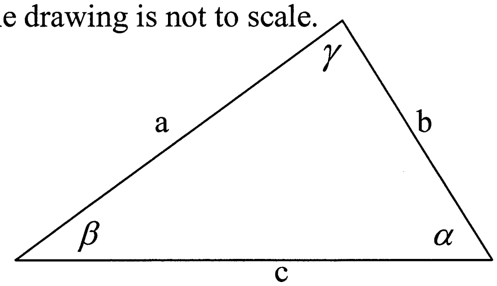
$a_n =$ __________

21. (3 points). Find the sum of the sequence below.

$$\sum_{k=1}^{3} (k^2 + 4) = \_\_\_\_\_\_\_\_\_\_$$

22. (3 pts.) At 10 AM on April 26, 2008, a building 300 feet high casts a shadow 50 feet long. Draw a sketch and calculate the angle of elevation of the Sun?

23. (4 pts. each). Use the given triangle to find the indicated quantities in parts (a-c) below. Simplify your answer to the point where you would need a calculator. The drawing is not to scale.



a) If $\beta = 70^\circ$, $\gamma = 10^\circ$, and b=5. Find a.

a = ____________________

b) If b=4, c=3, and $\beta = 40^\circ$, find α. (Write your answer in terms of an inverse trig function.)

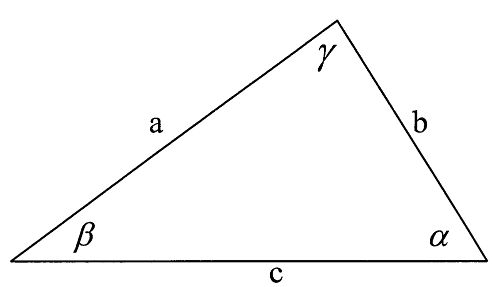
α = ____________________

c) If a=3, c=2, and $\beta = 110^\circ$, find b .

b = ______________________

24. (4 points). Find the area of the triangle given the following information. The drawing is not to scale.

a=6, b=4, and $\gamma = 60^\circ$



Area = _____________________

Sum and Difference Identities

$\sin(u \pm v) = \sin u \cos v \pm \cos u \sin v$
$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$

Double Angle Identities

$\sin 2u = 2\sin u \cos u$
$\cos 2u = \cos^2 u - \sin^2 u = 2\cos^2 u - 1 = 1 - 2\sin^2 u$

Half Angle Identities

$\sin(\frac{\theta}{2}) = \pm\sqrt{\frac{1-\cos\theta}{2}}$ $\cos(\frac{\theta}{2}) = \pm\sqrt{\frac{1+\cos\theta}{2}}$

DeMoivre's Theorem

If $z = r(\cos\theta + i\sin\theta)$, then $z^n = r^n(\cos(n\theta) + i\sin(n\theta))$

Law of Sines

$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$

Law of Cosines

$a^2 = b^2 + c^2 - 2bc\cos\alpha$

Properties of Series

1. $\sum_{k=1}^{n} c = c \cdot n$
2. $\sum_{k=1}^{n} c \cdot a_k = c \cdot \sum_{k=1}^{n} a_k$
3. $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$
4. $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

Graphing Trig Functions

$y = A\sin(\omega x - \phi)$ or $y = A\cos(\omega x - \phi)$

Amplitude = |A| Period = T = $\frac{2\pi}{\omega}$ Phase Shift = $\frac{\phi}{\omega}$

Area of a Triangle

$\frac{1}{2}ab\sin(\theta)$