MATH 1120 UNIFORM FINAL EXAM

May 10th, 2008

Name: ______________________________

Student Number: ______________________________

Circle Your Section and Instructor:

001	002	003
Nadia Hamoudi M/W 4:00-5:15	Erik Heiny M/W 1:00-2:15	Burt Simon T/TH 8:30-9:45

Directions:

1. Complete the Section Above.
2. Put your name on page 1 of the test. You should have 6 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 a verification on how you have completed a problem.

Do Not Write In This Space

Page 1 (29 Points)	Page 2 (20 Points)	Page 3 (19 Points)	Page 4 (22 Points)
Page 5 (14 Points)	Page 6 (24 Points)	Page 7 (22 Points)	

Total: ____________________ (Out of 150 Points)

Name : ______________________________________ **Date:** ____________________

1. (18 pts.) Find the exact value of each expression. Circle your final answer.

a) $\cos(\frac{4\pi}{3})$

d) $\cos^{-1}(-\frac{\sqrt{2}}{2})$

b) $\tan(\frac{8\pi}{3})$

e) $\sec(\frac{5\pi}{4})$

c) $\sin(-240^{\circ})$

f) $\sin(\frac{5\pi}{6})$

2. (3 pts) Convert the angle whose measure is 80° to radians. Simplify your answer.

3. (6 pts.) The terminal side of angle θ passes through (6, -8). Find the exact value of each trigonometric function of θ. Simplify your answers.

$\sin(\theta) =$

$\tan(\theta) =$

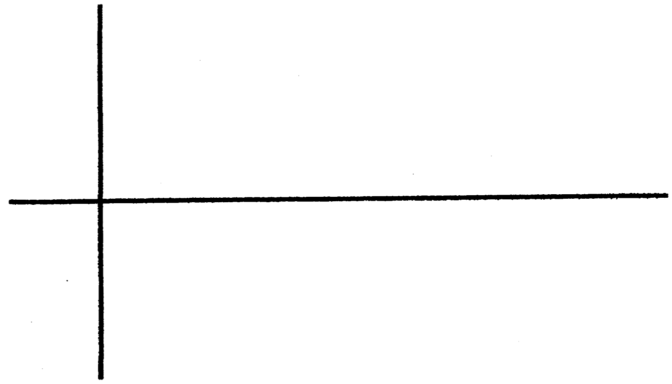
$\sec(\theta) =$

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

5. (6 pts.) Sketch the graph of $y = \cot(x)$ on the interval $[0, 2\pi]$. Show asymptotes with dotted lines. State the domain and range.

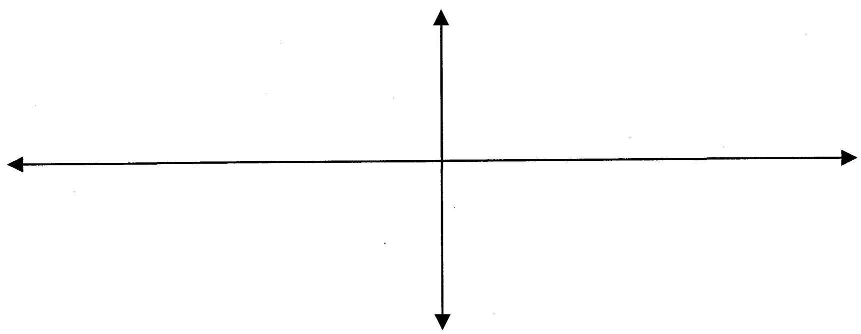
Domain: ________________

Range: ________________



6. (7 pts. Each) Sketch the graph (at least one period) of each function below and state the amplitude, period, vertical shift, and phase shift. Label the important values on the axes.

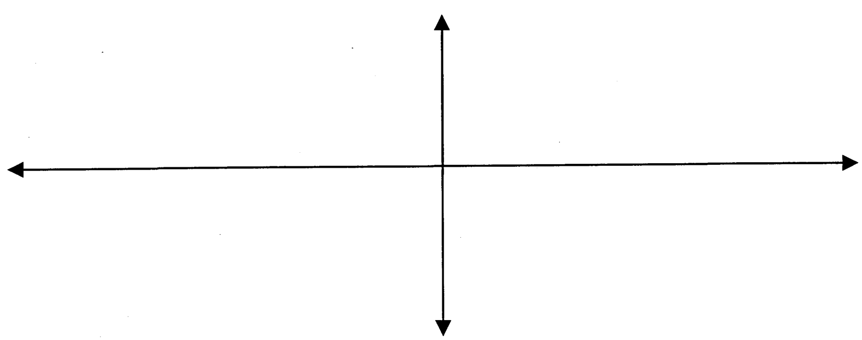
a. $y = -2\cos(x) + 1$



Amplitude: ____________________ Period: ____________________

Vertical Shift: ____________________ Phase Shift: ____________________

b) $y = 4\sin(3x - \pi)$

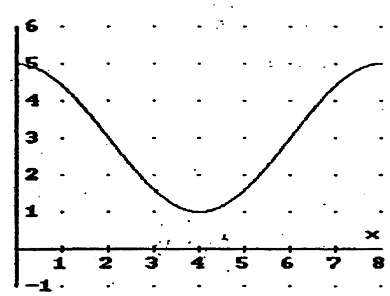


Amplitude: ____________________ Period: ____________________

Vertical Shift: ____________________ Phase Shift: ____________________

7. (5 pts.) One period of a trig function is shown below. Write an equation for the function.

y = ______________________



8. (5 pts. each). Prove the following identities. Show all steps.

a. $\tan\theta + \cot\theta = \sec\theta \csc\theta$

b. $\dfrac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$

9. (4 pts.) Find the exact value of $\sin(\frac{11\pi}{12})$.

10. (4 pts. each). If $\sin\alpha = \frac{3}{5}$, $\frac{\pi}{2} < \alpha < \pi$; $\cos\beta = \frac{-5}{13}$, $\frac{\pi}{2} < \beta < \pi$, find the exact value of:

a. $\sin(\alpha + \beta)$=

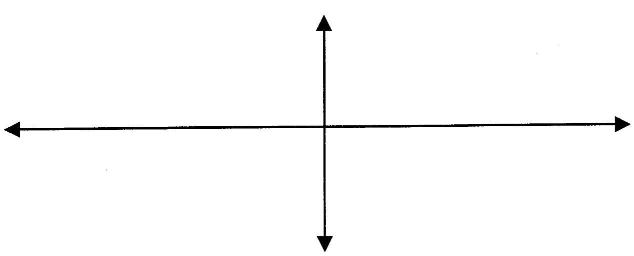
b. $\cos(2\beta)$=

11. (4 pts.) Solve the following trigonometric equation on the interval $[0, 2\pi]$. Show your work.

$\sin 2\theta + \cos\theta = 0$ $\qquad\qquad$ $\theta =$ ______________________

12. (2 pt.) Sketch the graph of **f(x) = cosx** on $[-2\pi, 2\pi]$.

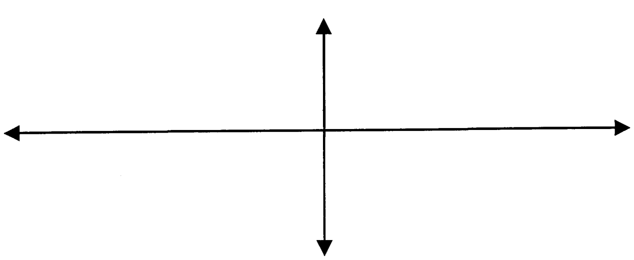
a.



b. (2 pts.) The function f is not a one-to-one function. To make it a one-to-one function, restrict the domain to:

[__________, __________]

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

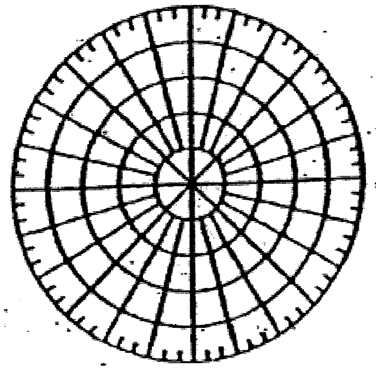


Domain: ________________

Range: ________________

d. (2 pts.) Find: $\cos^{-1}(-1) =$ ______________

13. Given the point (-4, $\frac{5\pi}{4}$) in polar coordinates.



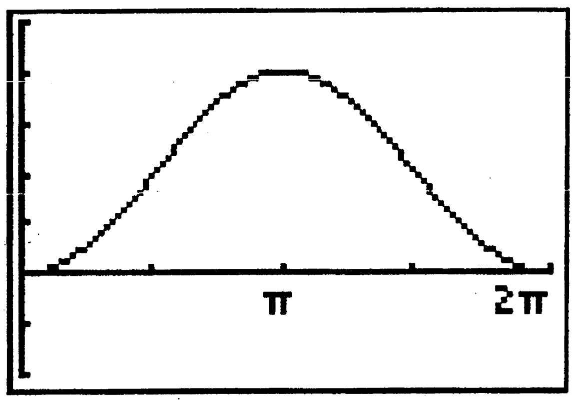
a. (2 pts.) Plot the point.

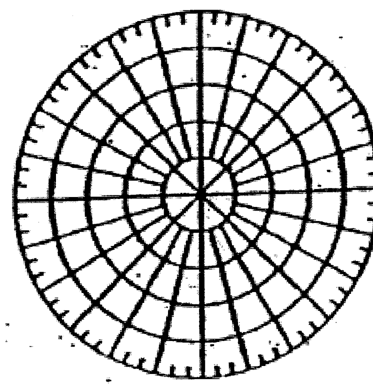
b. (2 pts.) Find other polar coordinates (r, θ) of the point for which $r > 0$ and $0 < \theta < 2\pi$.

(________, ________)

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

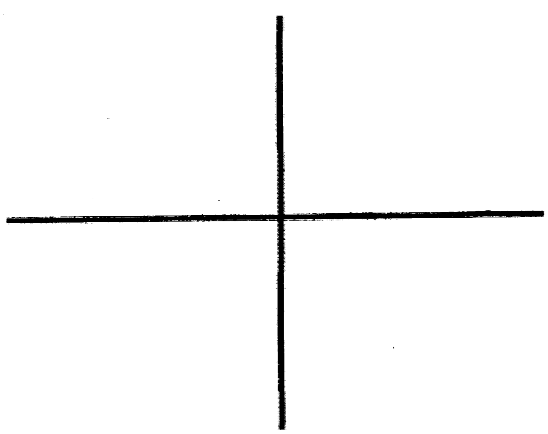
14. (4 pts.) Given the polar equation $r = 2 - 2\cos\theta$ and its corresponding graph in rectangular form. Sketch the graph of the equation in polar equations.





15. Given the complex number $-6+6i$,

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



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

16. Given the complex number in polar form $z = 2(\cos 120^\circ + i \sin 120^\circ)$

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

b. (4 pts.) Calculate and simplify: (Note: Simplify your answer, but you may leave it in polar form.) $z^5 =$

17. (4 pts.) If you graphed the parametric equations $x = \sqrt{t} + 4$ and $y = -4t^2$, on the interval $[1, 4]$ the starting point of the graph would be (_______ , _______) and the ending point would be (_______ , _______).

18. (4 pts. each). Write the first 4 terms of the sequences defined as:

a. $\left\{(-1)^{n+1} \cdot \frac{n}{n+1}\right\}$ _________ , _________ , _________ , _________

b. $a_1 = -2,\ a_n = n \bullet a_{n-1}$ _________ , _________ , _________ , _________

19. (4 pts.) Write a rule for the nth term of the sequence that begins, $\frac{1}{3}, \frac{3}{6}, \frac{5}{9}, \frac{7}{12}, \ldots$

$a_n =$ ___________

20. (5 pts.) Write the first two terms and the twelfth term of the series. Then, using the properties of sigma notation, find the sum of the series.

$$\sum_{k=1}^{12}(k^2+3k-6) = \underline{\qquad\qquad} + \underline{\qquad\qquad} + \ldots \underline{\qquad\qquad} =$$

21. (5 pts.) The angle of elevation to the top of a building from a point 300 ft. away from the base of the building on level ground is 30°. Find the height of the building.

22. (4 pts. each) Find the indicated part of the triangles below.

a. If $\alpha = 30^\circ$, $\beta = 105^\circ$, and a=7, find c.

b. If a=12, b=4, and $\alpha = 120^\circ$, find β. (Write your answer in terms of an inverse trig function.)

c. If $\alpha = 60^\circ$, b=6, and c=8, find a.

College Trigonometry **Formula Sheet for Final Exam Spring 2008**

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

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

Polar Coordinates $(x, y) \leftrightarrow (r, \theta)$ $x = r\cos\theta$ $r = \sqrt{x^2 + y^2}$

And $y = r\sin\theta$ $\theta = \tan^{-1}(\frac{y}{x})$

Complex Numbers $x + yi \leftrightarrow r(\cos\theta + i\sin\theta)$

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 = $\frac{\phi}{\omega}$