MA 1120 Spring 2007 UNIFORM FINAL
May 5th, 2007

Name: ______________________________

Circle Your Section Number:

001	002	003
Das Gupta	Olson	Nabity
M/W 5:30-6:45	T/TH 1:00-2:15	M/W 8:30-9:45

Instructions:

- **Put your name on this page, the next page, and part II, which you will pick up after you have handed in part I.**
- **Circle your Section Number Above.**
- **Scratch paper will be provided. No notes will be allowed on this exam. No calculator will be allowed on part I. When you pick up part II you can then use your graphing calculator.**
- **If you are unclear what a problem is asking, then talk to your instructor for clarification. You may not ask for hints, verification of formulas, or if you have done the problem correctly. This exam is over what YOU know to date.**
- **Be neat. If the grader cannot understand what you have recorded, you will not get credit.**

DO NOT WRITE BELOW THIS LINE

Page 1 23 points	Page 2 20 points	Page 3 17 points	Page 4 22 points
Page 5 23 points	Page 6 26 points	Page 7 19 points	

Total: __________ **(Out of 150 Points)**

Name: ______________________ **Score:** ______________________

Part I: Non-Calculator Section

1. (2 pts each). Find the exact value of each expression. Circle your final answer.

   a. $\sin\left(\frac{3\pi}{4}\right)$

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

   b. $\tan\left(\frac{2\pi}{3}\right)$

   e. $\tan^{-1}(1)$

   c. $\cos\left(\frac{7\pi}{6}\right)$

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

2. (3 pts) Convert the angle whose measure is 330° to radians. Simplify your answer.

3. (6 pts.) The terminal side of angle θ passes through (-2, 3). Find the exact value of each trigonometric function of θ. Simplify your answers.

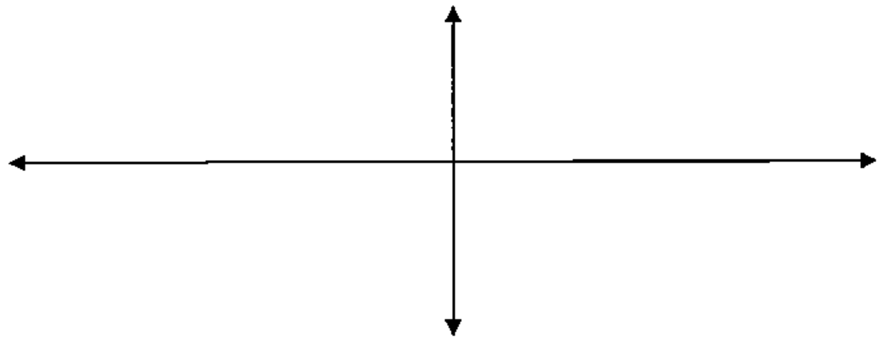
$\cos(\theta) =$

$\tan(\theta) =$

$\csc(\theta) =$

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

5. (6 pts.) Sketch the graph of y = csc(x). Show asymptotes with dotted lines. State the domain and range.

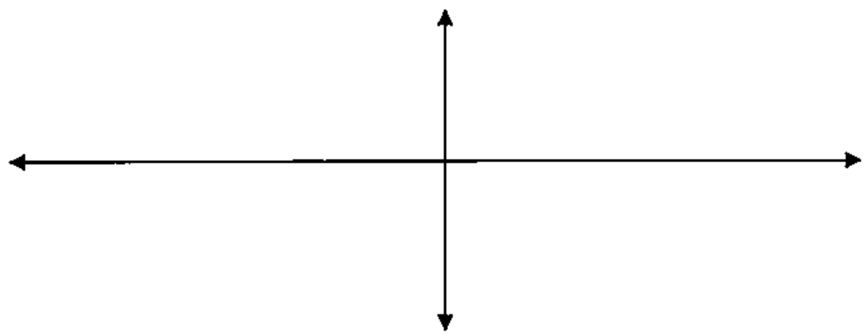


Domain: ______________

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.

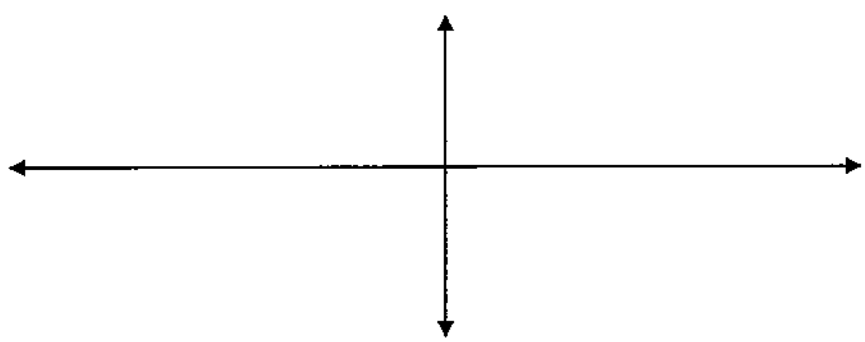
a. $y = 3\cos(2x + \pi)$



Amplitude: ____________________ Period: ____________________

Vertical Shift: __________________ Phase Shift: __________________

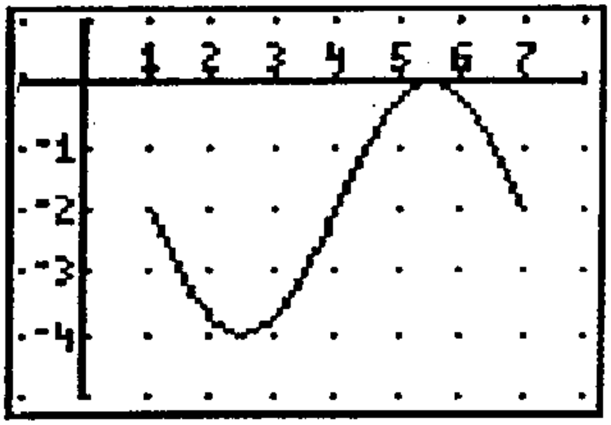
b) $y = -2\sin(x) - 1$



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

a. $\sin(\frac{3\pi}{2}+\theta)=-\cos\theta$

b. $\sin\theta\csc\theta-\cos^2\theta=\sin^2\theta$

9. (4 pts.) Find the exact value of $\cos(\frac{7\pi}{12})$.

10. (4 pts. each). If $\cos\alpha = \frac{\sqrt{5}}{5}$, $0 < \alpha < \frac{\pi}{2}$; $\sin\beta = \frac{-4}{5}$, $-\frac{\pi}{2} < \beta < 0$, find the exact value of:

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

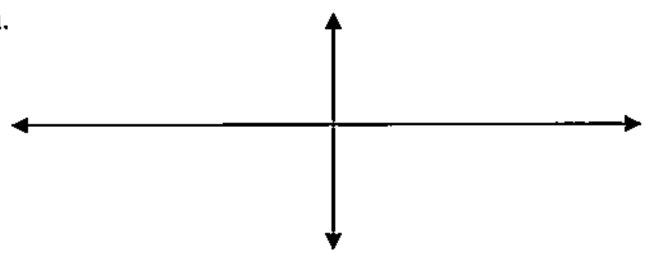
b. $\sin(2\beta) =$

11. (5 pts.) Solve the following trigonometric equation on the interval $[0, 2\pi]$. Show your work.

$2\sin\theta + 1 = 0$ $\qquad\qquad$ $\theta =$ ______________________

12. (1 pt.) Sketch the graph of **f(x) = sinx** on $[-2\pi, 2\pi]$.

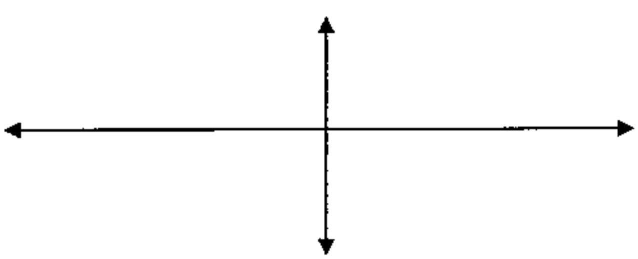
a.



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 $f^{-1}(x) = \sin^{-1}(x)$. Sketch the graph of f^{-1} and state the **domain** and **range.**

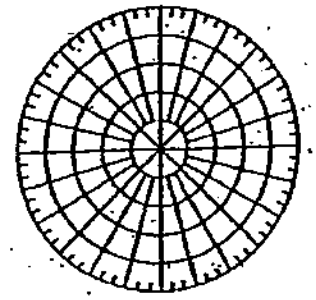


Domain: ________________

Range: ________________

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

13. Given the point $(-2, \frac{5\pi}{3})$ in polar coordinates.



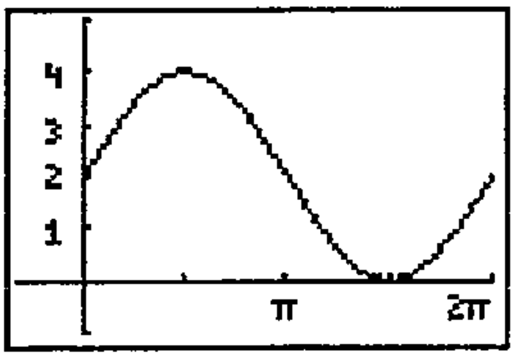
a. (2 pts.) Plot the point on the polar coordinate grid to the right.

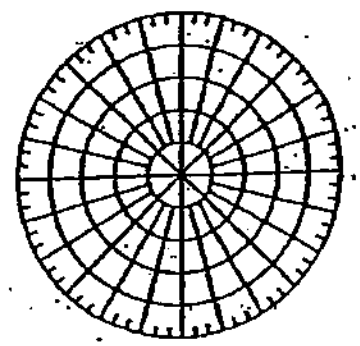
b. (2 pts.) Find other polar coordinates (r, θ) of the point for which $r > 0$ and $0 < \theta < 2\pi$.

(________, ________)

c. (3 pts.) Find the rectangular coordinates of the point. (________, ________)

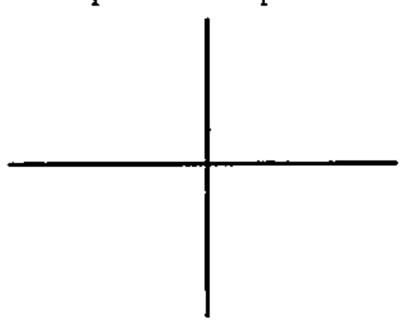
14. (5 pts.) Given the polar equation $r = 2 + 2\sin\theta$ and its corresponding graph in rectangular form. Sketch the graph of the equation in polar coordinates.





15. 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.

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

a. (3 pts.) Write z in rectangular form.

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

$z^3 =$

17. Given the equation $y^2 - 8x^2 - 2x - y = 0$

a. (2 pts.) The graph of the equation would be which conic? ______________________

b. (4 pts.) In order to graph the conic on your calculator, you would first need to solve the equation for y using the Quadratic formula. Write the expressions you would enter into your calculator to graph the conic.

Y = ____

18. (4 pts.) If you graphed the parametric equations $x = 2\cos t$ and $y = 4\sin t$, on the interval $[0, \frac{3\pi}{2}]$ the starting point of the graph would be (______, ______) and the ending point would be (_____, _____).

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

a. $\left\{(-1)^{n-1}\left(\frac{n}{2n-1}\right)\right\}$ _________ , _________ , _________ , _________

b. $a_1 = 5,\ a_n = 2a_{n-1}$ _________ , _________ , _________ , _________

20. (3 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. (5 pts.) Write the first two terms and the ninth term of the series. Then, using the properties of sigma notation find the sum of the series.

$\sum_{k=1}^{9} k + 4 =$ _________ + _________ + . . . + _____________ = _______________

1st term 2nd term 9th term Sum

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

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

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. $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

Name: ______________________________ **Instructor:** ________________

Part II: Calculator Section

22. (5 pts.) A wire that is attached to the top of an 80 ft tall radio transmission tower, makes an angle of 45° with the ground. How long is the wire?

23. (4 pts. Each) Find the indicated part(s) of the triangles below. If more than one triangle is possible you need to provide both possible answers.

a. If b=2, c=3, $\beta = 40^\circ$. Find a.

b. If a=5, b=8, and c=9, find α.

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

24. (2 pts.) Solve the following equation on the interval $0 \le \theta < 2\pi$

$$4\cot\theta = -5$$