

# Test 3A, Math 130.001

SSII, 2009

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

PID Number: \_\_\_\_\_

I pledge that I have neither given nor received any unauthorized assistance on this exam.

\_\_\_\_\_  
(signature)

## DIRECTIONS

1. Show all of your work. A correct answer with insufficient work will be counted wrong.
2. Clearly indicate your answer by putting a box around it.
3. Calculators are allowed on this exam, but NOT cell phones or laptops.
4. Give all answers in exact form, not decimal form (that is, put  $\pi$  instead of 3.1415,  $\sqrt{2}$  instead of 1.414, etc) unless otherwise stated.
5. Total number of questions = <sup>10</sup>~~0~~. Total points = 100.
6. Make sure you sign the pledge and write your PID on both pages.

## MATH 130 FORMULA SHEET

These formulas will be provided on Test 3, Test 4, and the Final Exam.

### ADDITION & SUBTRACTION FORMULAS:

$$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$

$$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta}$$

### DOUBLE-ANGLE FORMULAS:

$$\sin(2\theta) =$$

$$\cos(2\theta) =$$

=

=

$$\tan(2\theta) =$$

### LAW OF SINES:

$$\text{LAW OF COSINES: } c^2 = a^2 + b^2 - 2ab \cos \gamma$$

### STANDARD FORM FOR CONICS:

PID Number: \_\_\_\_\_

1. (10 points) Let  $\cos \alpha = -\frac{4}{7}$  and  $\tan \alpha < 0$ . Evaluate the following:

(a)  $\cos\left(\alpha - \frac{\pi}{4}\right)$

(b)  $\csc(2\alpha)$

2. (10 points) At 2:00 PM a ship leaves port and travels N  $25^\circ$  E at a rate of 20 miles per hour. At 2:30 PM another ship leaves the same port and travels S  $70^\circ$  W at 30 miles per hour. To the nearest mile, how far apart are the ships at 4:30 PM?

3. (10 points) Approximate (to the nearest tenth of a degree) all solutions to the equation  $3 \sec^2 \theta - 3 \sec \theta - 1 = 0$  on the interval  $[0^\circ, 360^\circ)$ .

4. (10 points) Solve triangle ABC given  $a=6.3$ ,  $b=3.1$ , and  $\beta=51^\circ$ .

5. (10 points) Find ALL solutions to the equation

$$\sin\left(3\theta - \frac{\pi}{6}\right) = \frac{1}{2}$$

6. (10 points) Let  $\tan \beta = -\frac{12}{5}$  and  $\sin \beta < 0$ . Find the following:

(a)  $\sin(2\beta)$

(b)  $\tan(2\beta)$

(c) Which quadrant contains  $2\beta$ ?

7. (10 points) Find the exact solutions, on the interval  $[0, 2\pi)$ , to the equation

$$-\sin^2 \theta = \cos(2\theta)$$

8. (10 points) Find the exact value of  $\sin\left(-\frac{5\pi}{12}\right)$

9. (10 points) Find the exact values of the following. Let  $x > 0$ .

(a)  $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$

(b)  $\sin\left[\cos^{-1}\left(-\frac{2}{3}\right) + \tan^{-1}\left(\frac{1}{4}\right)\right]$

(c)  $\cot\left(\arcsin\left(\frac{x}{5}\right)\right)$

10. (10 points) Dominic and Zia are standing on opposite sides of the Golden Gate Bridge, looking down at a whale swimming under the bridge. If the angle of depression from Dominic to the whale is  $68^\circ$ , the angle of depression from Zia to the whale is  $77^\circ$ , and Dominic and Zia are 450 feet from each other, how high above the water is the bridge?

Extra Credit(2 points): Use an example to illustrate that  $\sin(\alpha + \beta) \neq \sin \alpha + \sin \beta$