

April 20th

Math 112 - section _____
 Test 3, version A, spring 2011 100
 Sections 8.7-8.8, 9.1-9.5 and 13.1-13.3

NAME: Answers

Seat: _____

Ave quiz % =
 Ave HW % =
 Test 1 & 2 & 3 =
 Total =
 Total / 5 = semester % =

Full credit is based on work shown!

- 9, 2 # 36
 Law of sines
 10pts
 1. Solve for **angle C** in a triangle where $b = 4$, $c = 5$, and angle $B = 40^\circ$.
 [Note: This is not a right triangle.]

$$\frac{\sin B}{b} = \frac{\sin C}{c}$$

4pts

$$\frac{\sin 40^\circ}{4} = \frac{\sin C}{5}$$

$$4 \sin C = 5 \sin 40^\circ$$

2pts

$$\sin C = \frac{5(\sin 40^\circ)}{4} = \frac{5(0.6427876...)}{4}$$

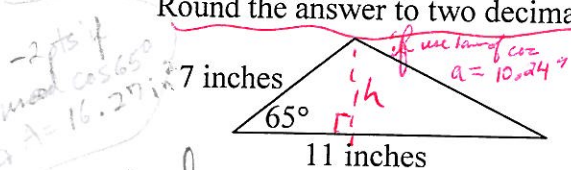
$$\sin C = 0.8034845...$$

$$C \approx \underline{53.46^\circ} \quad \text{or} \quad \underline{126.54^\circ}$$

2pts 2pts

Note: $\angle A = 86.54^\circ$ or $\angle A = 13.46^\circ$

- 10pts
 2. Find the area of this triangle. It is not a right triangle.
 Round the answer to two decimal places and include appropriate units with your answer.



$$\text{Area} = \frac{1}{2}(\text{side}_1)(\text{side}_2)(\sin \angle \text{ between } s_1 \text{ \& } s_2)$$

$$= \frac{1}{2}(11)(7)(\sin 65^\circ) \quad 5pts$$

$$= \frac{77}{2}(0.9063...) \quad 3pts$$

$$\approx \underline{34.89} \text{ square inches} \quad 2pts$$

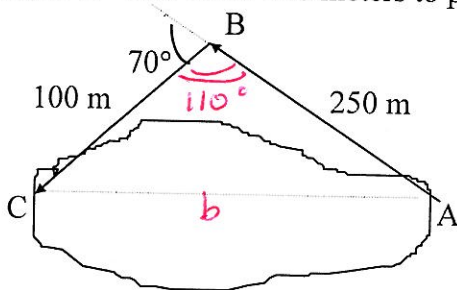
optional

$$\sin 65^\circ = \frac{h}{7} \approx 0.34$$

$$7 \sin 65^\circ = h$$

$$\text{so } A = \frac{1}{2}bh$$

- 10pts
 3. To approximate the length of a marsh, a surveyor walks 250 meters from point A to point B, then turns 70° and walks 100 meters to point C. Calculate the approximate the length AC across the marsh.



$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$b^2 = 100^2 + (250)^2 - 2(100)(250)(\cos 110^\circ) \quad 4pts$$

$$b^2 = 10,000 + 62,500 - [50,000(-0.3420...)]$$

$$b^2 \approx 72,500 + 17,101.0077$$

$$b^2 \approx 89,601 \quad 4pts$$

$$b \approx \underline{299.33} \text{ meters} \quad 2pts$$

-2pts if used $\cos 70^\circ$
 + got AC = 235.37m

Full credit is based on work shown! (If you choose to use your calculator for sequences, include appropriate information on what to type to generate sequences and/or sums of sequences.)

16pts
4. Answer the following questions for this sequence: $14, 22, 30, 38, 46, \dots$

a. Is this an arithmetic sequence or a geometric sequence? arithmetic 2pts

b. Write a formula for the n^{th} term of this sequence. c. What is the 25th term?

5pts
function $a_n = 14 + (n-1)(8)$

or $a_n = 14 + 8n - 8 = 6 + 8n$

or $a_1 = 14$ and $a_n = a_{n-1} + 8$

4pts $a_{25} = 14 + 24(8) = 14 + 192 = 206$

or $a_{25} = 6 + 8(25) = 206$

or $\text{seq}(6+8n, n, 1, 25) = \dots, 206$

d. What is the sum of the first 25 terms?

5pts $S_{25} = \frac{n}{2}(a_1 + a_n) = \frac{25}{2}(14 + 206) = 12.5(220) = 2750$

or $\text{sum}(\text{seq}(6+8n, n, 1, 25)) = 2750$

16pts

5. a. Write out the first 5 terms in this infinite sequence.

5pts $\sum_{k=1}^{\infty} 8\left(\frac{1}{3}\right)^{k-1} = 8 + \frac{8}{3} + \frac{8}{9} + \frac{8}{27} + \frac{8}{81}$

b. Is this an arithmetic sequence or a geometric sequence? geometric 2pts

c. What is the sum of the first 5 numbers? d. What is the sum of the infinite sequence?

5pts $S_5 = 8 \left(\frac{1 - (\frac{1}{3})^5}{1 - (\frac{1}{3})} \right) = 8 \left(\frac{1 - \frac{1}{243}}{\frac{2}{3}} \right)$

$S_5 = 8 \left(\frac{242}{243} \times \frac{3}{2} \right) = \frac{968}{81}$

≈ 11.95061728

4pts $S_{\infty} = \frac{a_1}{1-r} = \frac{8}{1 - \frac{1}{3}} = 8 \div \frac{2}{3} = 8 \times \frac{3}{2} = 12$

or $\text{sum}(\text{seq}(8/3^{(n-1)}, n, 1, \text{try } \#s > 5))$

(sum approaches 12
 $\rightarrow 11.999\dots$)

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18pts

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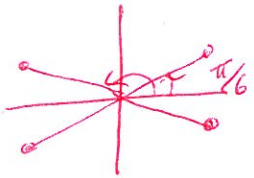
6. Solve for θ . Give answers as exact values, in fractional forms of π , on the interval $0 \leq \theta < 2\pi$.

(8pts)
a. $4 \cos^2 \theta = 3$

2pts $\cos^2 \theta = \frac{3}{4}$

2pts $\cos \theta = \pm \sqrt{\frac{3}{4}} = \frac{\pm \sqrt{3}}{2}$

4pts thus $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$



10pts

7. A wire 67 feet long is attached to the top of a radio transmission tower, making an angle of 55° with the ground. How high is the tower? 54.88 ft Draw a sketch to illustrate this problem and solve for the height. Note: The tower is perpendicular to the ground.



3pts $\sin 55^\circ = \frac{h}{67'}$

2pts $67 (\sin 55^\circ) = h$
 $67 (.819152...) \approx h$

2pts 54.88 ft $\approx h$

10pts

8. The displacement, d , (in feet) of an object at time t (in seconds) is given by $d = 3 \sin(4t)$.

[Include units with your answers.]

2pts a. In this simple harmonic motion, what is the maximum displacement from its rest position? 3 ft

2pts b. What is the time required for one oscillation? $\frac{2\pi}{4}$ Sec

3pts c. Draw a sketch to illustrate this motion. Label each axis with appropriate units.

