MAC 1114 # EXAM FOUR FALL-2016

Name

Signature

| Problem | Total Points | Score |
|---|---|---|
| 1 | 10 | |
| 2 | 15 | |
| 3 | 20 | |
| 4 | 15 | |
| 5 | 15 | |
| 6 | 10 | |
| 7 | 10 | |
| 8 | 15 | |
| Total | 110 | |

- You are not permitted to use a calculator on this exam.
- In order to receive full credit, you must show your work. Be wary of doing computations in your head. Instead, write out your computations on the exam paper.
- If you need more room, use the backs of the pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.
- Good luck!

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1 (10 points) Verify the following identity.

$$(\sin\theta - \cos\theta)^2 = 1 - \sin 2\theta$$

2 (15 points)

(a) (5 points) Find the exact value of $\sin(\sin^{-1}(-2))$

(b) (5 points) Find the exact value of $\cos^{-1}(-\frac{\sqrt{3}}{2})$

(c) (5 points) Complete the following equality

$$\tan(70^\circ) = \cot(\ ?\ )$$

.

3 (20 points)

(a) (5 points) Find the rectangular coordinates of $(r, \theta) = (-4, -150^\circ)$.

(b) (5 points) Give another representation of $(r, \theta) = (-4, -150^\circ)$.

(c) (10 points)

Convert the following polar equation to a rectangular equation

$$r = 10 \sin \theta$$

4 (15 points) John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 33°. This particular tree grows at an angle of 83° with respect to the ground rather than vertically (90°). How tall is the tree? (You can leave your answer in the calculator ready form.)

5 (15 points) Find the largest angle of the triangle with $a = 6$, $b = 8$, and $c = 10$.
You need to use either the law of sines or the law of cosines for this question, other methods will be disregarded. (You can leave your answer in the calculator ready form.)

6 (10 points) Identify the polar graph (line, circle, cardioid, limacon, rose): If a circle, name the center and the radius. If a limacon, name the type. If a rose, state the number of petals.

(a) (5 points) $r = 6\cos\theta$

(b) (5 points) $r = 4\sin 3\theta$

7 (10 points) Take the power of the following complex number. Write the answer in rectangular form.

$$[2(\cos 30^\circ + i\sin 30^\circ)]^5$$

8 (15 points) Test for symmetry and graph the polar equation $r = 1 + \cos(\theta)$
(note that $\sqrt{3} \approx 1.7$ and $\sqrt{2} \approx 1.4$)