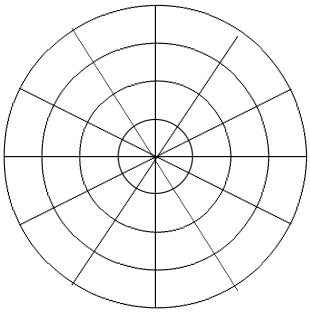
HATT Ch 10 Practice Name: Seat:

1. (2 points) Graph the polar coordinate $\left(-2, \frac{\pi}{3}\right)$



2. (2 points) What is the polar form of $(5\sqrt{2}, -5\sqrt{2})$?

3. (2 points) What is the polar form of $-6 - 6\sqrt{3}i$?

4. (2 points) What is the rectangular form of $(4, \frac{7\pi}{6})$ or $(4, 210°)$?

5. (2 points) What is the rectangular form of $4e^{7\pi i/6}$ (this is the same as $4(\cos\frac{7\pi}{6} + i\sin\frac{7\pi}{6})$)

6. (6 points) Consider the complex number

$$z = -6 + 6\sqrt{3}i$$

(a) What is the polar form of z?

(b) What is the polar form of z^4?

(c) What is the rectangular $(a + bi)$ form of z^4?

7. (4 points) Consider the complex numbers

$$z = 5(\cos 200° + i\sin 200°)$$
$$w = 4(\cos 50° + i\sin 50°)$$

(a) Find zw

(b) Find $\frac{z}{w}$

8. (4 points) Convert the polar equation into an equation that only (x, y)

$$r = \frac{5}{1 + \cos\theta}$$

9. (10 points) Consider the vector $\mathbf{v} = -3\mathbf{i}+4\mathbf{j}$ and the vector $\mathbf{w} = 5\mathbf{i} - 12\mathbf{j}$

(a) What is $\mathbf{v} - 2\mathbf{w}$?

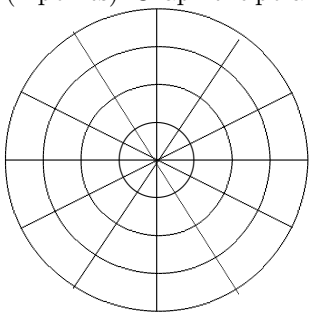
(b) Compute the magnitude $\|\mathbf{v}\|$.

(c) Compute the magnitude $\|\mathbf{w}\|$.

(d) Compute the dot product $\mathbf{v} \cdot \mathbf{w}$

(e) What is the angle between $\mathbf{v}$ and $\mathbf{w}$?

10. (2 points) Graph the polar equation $r = 8\sin(3\theta)$



11. (4 points) What are the 3 third roots of $27e^{\pi i/10}$, otherwise known as $27(\cos\frac{\pi}{10} + i\sin\frac{\pi}{10})$?

12. (4 points) Consider $r^2 = 11 + 8r\cos\theta - 6r\sin\theta$

    (a) What is the rectangular form of this equation?

    (b) What coordinate is the center of this circle?

13. (2 points) What is the rectangular form of the polar equation $r = 4\sin\theta$

14. (6 points) Lois Lane spotted Lex Luther getting away in a boat traveling due east (Hint: along the polar axis) to a hide out 30 km away. The current is going 8 kph $N44°E$ (Hint: 44° to the right of North). Lex Luther's boat at full throttle can travel 18 kph.

    (a) At what angle should the Lex steer the boat, so that together with the water current, it travels due east? (round to the nearest tenth of a degree)

    (b) How long will it take the boat to get to the hide out? (answer in terms of minutes and seconds to the nearest second)

15. (6 points) A swimmer who swims at 5 mph (in still water) wants to travel due North across a river, but the current is traveling due west at 2 mph.

(a) In what direction should the swimmer swim to travel so she is able to travel due North, despite the current?

(b) How fast is she able to travel this way?

(c) If the river is half a mile across, how long will it take her?

16. (6 points) An audio speaker that weighs 50 pounds hangs from the ceiling of a restaurant from two cables as shown in the figure. The left cable makes a 45 degree angle with the ceiling, and the right cable makes a 35 degree angle with the ceiling. What is the the tension in the left and right cables? *(Hint: Make 2 equations to solve for two unknowns: The total vertical force is 50 pounds and the horizontal forces are equal)*