Activity 10 - Solutions
MTH 112

1. Complete the table and graph the points or graph with a calculator. You should get a circle.

2. Pick a parametric equation for \( y \), say \( y = t \). Now we have \( 2x = 3t^2 + 2\sin(t) \) and thus \( x = \frac{3}{2} t^2 + 2\sin(t) \). Our polar equations are

\[
x = \frac{3}{2} t^2 + 2\sin(t), \quad y = t.
\]

3. Graph them by hand or with a calculator. (a) should be a circle of radius three, (b) should be the \( x \)-axis, and (c) should be a spiral coming out of the origin.

4. (a) We have two solutions, \( \theta_1 \) in quadrant I and \( \theta_2 \) in quadrant II. \( \theta_1 \approx 0.3398 \) (radians) and \( \theta_2 \approx 2.8018 \) (radians). Hence \( \theta_1 \theta_2 \approx 0.95 \).

5. (b) If \( \theta \) is in QIII, then \( \theta = 180^\circ + \theta_R \).

6. (c) This is an application of \( \cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta \).

7. (a) This is an application of \( \sin^2 \theta = \frac{1 - \cos(2\theta)}{2} \).

8. (b)

9. (a) \( \mathbf{a} = 3\mathbf{b} = \langle 1, 2 \rangle + \langle 6, 3 \rangle = \langle 7, 5 \rangle \).

10. (d) \( 67^\circ - 360^\circ = -293^\circ \)

11. (a) \( a = 3, b = \pi, c = 0, d = 0 \)

12. (c) \( \omega = \frac{2\pi}{32} \approx 0.19635. \quad v = \omega r \approx 0.19635(200) \approx 39 \).

13. (c)

14. (e) The domain of \( \cos^{-1}(x) \) is \([-1, 1]\), and the range is \([0, \pi]\). The domain of \( \sin^{-1}(x) \) is also \([-1, 1]\), but the range of \( \sin^{-1}(x) \) is \([-\frac{\pi}{2}, \frac{\pi}{2}]\).

15. (a) \( \sin^2 \theta + \cos^2 \theta = 1 \), so \( \cos^2 \theta = \sqrt{1 - \sin^2 \theta} = \sqrt{1 - \frac{1}{9}} = \sqrt{\frac{8}{9}} = \frac{2\sqrt{2}}{3} \).