

Ma 110 Exam 4 Review: Sections 7.4-7.5, 8.3-8.4, 10.1, 10.3, 10.5

Do not rely solely on this work sheet! This review is only for the material since the last exam. The final exam is comprehensive and will include problems from the entire semester. Make sure to study homework problems, other work sheets, lecture notes, and the book!!!

1. Section 7.4 (suggested problems from HW35 - #'s 3, 7, 9, 10)

(a) Solve each problem for t exactly.

i. $\cos(t) = \frac{\sqrt{3}}{2}$.

ii. $\sin^{-1}\left(\sin\left(\frac{7\pi}{6}\right)\right) = t$.

iii. $\sin\left(\cos^{-1}\left(\frac{6}{7}\right)\right) = t$.

(b) Write an algebraic expression for $\cos(\tan^{-1}(x))$ in terms of x .

2. Section 7.5 (suggested problems from HW36 - #'s 1, 3, 7)

(a) Find all solutions for each of the following:

i. $\frac{\sin(5x) + 7}{3} = 10$

ii. $\tan(x) = -\frac{1}{\sqrt{3}}$

iii. $\tan^2(x) + 1 = 5$

iv. $\cos(2x - 3) = -\frac{\sqrt{2}}{2}$

v. $\sin^2(x) - \cos^2(x) = 0$

3. Section 8.3 (suggested problems from HW37 - #'s 1, 3, 5, 8)

(a) Solve the triangle. $a = 15, b = 7, C = 52^\circ$

(b) Solve the triangle. $a = 3.7, b = 4.2, c = 2.1$

(c) Jack and Jill begin walking from the same spot toward opposite ends of a lake. Jack reaches his shoreline after walking 150 yards, while Jill reaches her shoreline in 250 yards. If the angle between them measures 56° , how wide is the lake?

4. Section 8.4 (suggested problems from HW38 - #'s 1, 2, 5)
- Solve the triangle. $a = 15, b = 7, B = 52^\circ$
 - Solve the triangle. $c = 5.1, B = 25^\circ, A = 30.2^\circ$
 - Jack and Jill are standing 20 feet apart. Jack's angle of elevation to the top of a nearby tree is 45° , while Jill is closer and measures her angle of elevation at 75° . How tall is the tree?
5. Section 10.1 (suggested problems from HW39 - #'s 4, 5, 6, 7)
- For each of the following, identify which conic section is represented by the equation. If it is a circle, give its center and radius. If it is an ellipse, give its center, vertices, and foci. Sketch the graph of each.
 - $3x^2 + 3y^2 - 24y = -18x - 15$.
 - $\frac{(x-2)^2}{36} + \frac{(y-6)^2}{12} = 1$.
 - $x^2 + 5y^2 - 8x + 30y + 41 = 0$.
 - An ice skating rink is elliptical in shape and is 150 feet long and 75 feet wide. What is the distance that an ice skater has to complete a spin that spans the width of the rink at a distance that is 15 feet from the vertex of the rink?
6. Section 10.3 (suggested problems from HW40 - #'s 2, 6, 9, 10)
- For each of the following, determine the vertex, focus, and directrix of the parabola *without graphing* and state whether it opens upward, downward, left, or right. Sketch the graph of each.
 - $y + (x + 2)^2 = 7$.
 - $2y^2 = x - 4y - 4$.
 - $4x^2 - 40x - 2y + 111 = 0$.
 - (Question 80, Section 10.3) A large spotlight has a parabolic reflector that is 3 feet deep at its center. The light source is located $1\frac{1}{3}$ feet from the vertex. What is the diameter of the reflector?
7. Section 10.5 (suggested problems from HW41 - #'s 2, 3, 4, 6, 10)
- Sketch a graph of the following parametric equations:
 $x(t) = 4 \cos t - 6, \quad y(t) = 4 \sin t + 6, \quad 0 \leq t \leq 2\pi$
 - The plane curve given by $x(t) = t^2 - 7, \quad y(t) = t^2 + 7$, where t is any real number, is part of the graph of an equation in x and y . Find the equation by eliminating the parameter.
 - Find a parameterization of the rectangular equation $x^2 + y^2 + 8x + 6y + 9 = 0$. Confirm your answer by graphing.