

Math 150 Exam 3 Review Problem Set

Note: This exam review does not cover every topic that could be covered on your exam. Please take a look at the previous Week in Reviews for more practice problems.

(Problems 3, 6, 7, and 15 were taken from *Precalculus* by Dugopolski)

1. The wheel from “Wheel of Fortune” is spun while you are sitting on the edge. Suppose the wheel has a radius of 5 ft and is spinning at a rate of 20 rpm.
 - (a) What is the angular speed of the wheel?
 - (b) At what speed will you fly off the wheel if it stops suddenly?
2. An antenna is anchored to the ground by 2 wires, one on each side. One wire has an angle of elevation of 40° . The other wire is 10 ft longer and has an angle of elevation of 35° . How tall is the antenna?
3. Jack and Jill set sail from the same point. Jack travels in the direction S 4° E and Jill travels in the direction S 9° W. After 4 hours, Jill is 4 miles due west of Jack. How far had Jill sailed?
4. Solve the triangle: $A = 60^\circ, b = 10, c = 12$.
5. Suppose that $\sec x = \frac{4}{3}$ and that x is in Quadrant IV.
 - (a) Find all other trig values of x .
 - (b) Find all trig values of $2x$.
6. Verify the identity: $\frac{\sec x}{\tan x} - \frac{\tan x}{\sec x} = \cos x \cot x$
7. Find the exact value of $\sin(x - y)$ given that $\sin x = -\frac{4}{5}$ and $\cos y = \frac{12}{13}$ with x in Quadrant III and y in Quadrant IV.
8. Find $\cos(285^\circ)$ by using an Addition or Subtraction Formula.
9. Use a Sum-to-Product Formula to evaluate $\sin 285^\circ - \sin 15^\circ$.
10. Evaluate the following.
 - (a) $\cos^{-1}(-\frac{1}{2})$
 - (b) $\sin^{-1}(\sin(\frac{7\pi}{6}))$
 - (c) $\csc(2 \tan^{-1} \frac{1}{2})$
11. (a) Find all solutions to the equation $\sin^2 x = \frac{\sqrt{3}}{4} + \frac{1}{2}$.
 (b) Find those solutions that are in the interval $[0, 2\pi)$.
12. Let $\mathbf{u} = \langle 3, -5 \rangle$ and $\mathbf{v} = \langle 7, 2 \rangle$. Calculate the following.
 - (a) $\mathbf{u} + \mathbf{v}$
 - (b) $|\mathbf{v} - 2\mathbf{u}|$
 - (c) $\mathbf{u} \cdot \mathbf{v}$

- (d) The angle between \mathbf{u} and \mathbf{v}
 - (e) The component of \mathbf{u} along \mathbf{v}
 - (f) $\text{proj}_{\mathbf{v}}\mathbf{u}$
13. A plane is traveling at a speed of 400 mi/hr in a direction of 120° relative to the wind. The wind is blowing due east at 20 mi/hr. Find the true velocity of the plane.
14. A constant force $\mathbf{F} = 5\mathbf{i} + 6\mathbf{j}$ moves an object from the point $(1, 1)$ to the point $(4, 7)$. Find the work done.
15. Sketch the graph of the solution set to the following system of inequalities. Then find the coordinates of all vertices of the solution set.

$$\begin{cases} y > x - 1 \\ y \leq x + 1 \\ x^2 + y^2 \leq 25 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

The following topics may or may not have been covered by your instructor.

16. Rewrite $-\sin x - \sqrt{3}\cos x$ as an expression of the form $k \sin(x + \phi)$.
17. If $\tan x = -\frac{\sqrt{7}}{3}$ and $270^\circ < x < 360^\circ$, find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$, and $\tan \frac{x}{2}$.