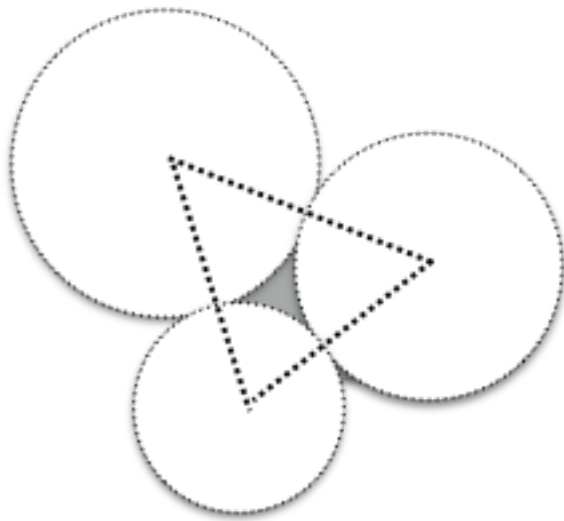


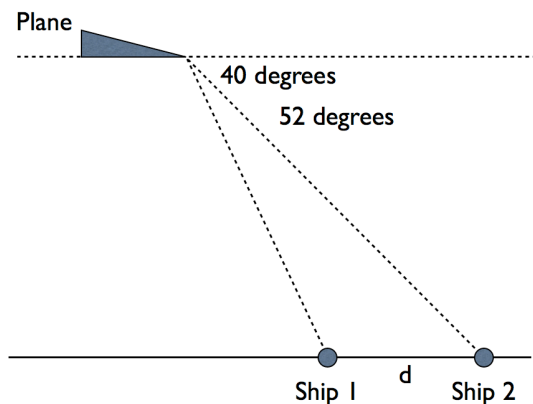
East Los Angeles College
Department of Mathematics
Math 241
Test 3 Study Guide

1. The circles are barely touching one another and have the following radii's- 4, cm, 5 cm, and 6 cm from smallest to largest. Determine the shaded area.



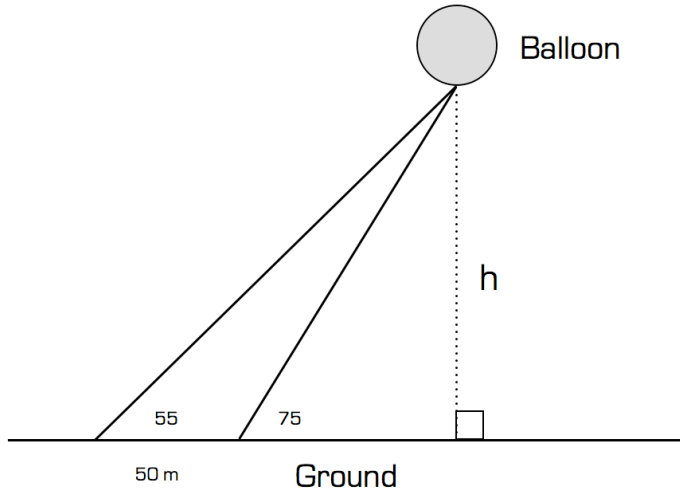
Distance Between Ships- A pilot measures the angles of depression to two ships to be 40 degrees and 52 degrees respectively. If the pilot is flying at an elevation of 45,000 feet,

2. What is the distance between the two ships?
3. What is the altitude of the plane?



Elevation of a Balloon An observer measures an angle of elevation of a balloon to be 55 degrees and walks 50 meters to measure a second angle of elevation of the same balloon to be 75 degrees.

4. What is the altitude of the balloon?



Navigation

Two cars leave the same intersection at noon. Car 1 travels at 65 mph in the direction of $N15^\circ E$ while car 2 travels at 40 mph in the direction of $N85^\circ E$.

- 5. How far apart are the cars at 2:00 PM?
- 6. How far apart are the cars at 4:30 PM?

Let P and Q be two points in a plane. Determine the coordinate vector \overrightarrow{PQ}

- 7. $P = (3, -1)$ and $Q = (-2, 5)$
- 8. $P = (0, -1)$ and $Q = (2, -2)$

Let $\vec{u} = -4\vec{i} + 2\vec{j}$ and $\vec{v} = 3\vec{i}$ and $\vec{w} = \vec{i} + 5\vec{j}$. Determine:

- 9. $\vec{u} + \vec{v}$
- 10. $\vec{u} - \vec{v}$
- 11. $2\vec{u} + 5\vec{w}$
- 12. $4\vec{v} - 3\vec{w}$
- 13. $|\vec{u}|$
- 14. $|\vec{v}|$
- 15. $|\vec{w}|$
- 16. $|\vec{u} + \vec{v}|$
- 17. $|\vec{u} - \vec{v}|$
- 18. $|4\vec{v} - 3\vec{w}|$

Find the horizontal and vertical components of the vector and write in \vec{i} and \vec{j} form.

- 19. $|\vec{v}| = 20$ and $\theta = 20^\circ$
- 20. $|\vec{v}| = 8$ $\theta = 100^\circ$

True Velocity of a Jet

A pilot heads her jet due East traveling at 700 mph. A wind is blowing at 45 MPH at a heading of $N10^\circ W$.

21. Express the velocity of the plane as a vector without the wind.
 22. Express the velocity of the wind as a vector.
 23. Express the velocity of the jet with the wind. That is, the resultant vector.
 24. What is the true speed of the jet with the wind?
 25. What is the true bearing of the jet with the wind?
-

Two Tug Boats Pulling on a Barge

Two tug boats pull a barge in different directions with different forces. Tug boat one pulls a barge with 10,000 pounds of force in the direction of $N25^\circ E$. Tug boat two pulls a barge with 18,000 pounds in the direction $S40^\circ E$. Answer the following questions.

26. What is the Tug boat One force vector?
 27. What is the Tug boat two force vector?
 28. What is the resultant force vector acting on the barge?
 29. What is the actual force applied on the barge by the two tug boats?
 30. What direction is the two tug boats are pulling the barge?
-

Prove the following Identities

31. $\frac{\tan(\theta)}{\csc(\theta)} = \sec(\theta) - \cos(\theta)$

32. $(1 - \cos(\theta))(1 + \cos(\theta)) = \frac{1}{\csc^2(\theta)}$

33. $2\cos^2(\theta) - 1 = 1 - 2\sin^2(\theta)$

34. $\frac{\sin(\theta)}{1 + \cos(\theta)} = \frac{1 - \cos(\theta)}{\sin(\theta)}$

35. $\tan^2(\theta) - \sin^2(\theta) = \tan^2(\theta)\sin^2(\theta)$

36. $\cos(x - \pi) = -\cos(x)$

37. $\sin(x + y) - \sin(x - y) = 2\cos(x)\sin(y)$

38. $\frac{\cos(x+y)}{\cos(x)\cos(y)} = 1 - \tan(x)\tan(y)$

39. $\csc\left(\frac{\pi}{2} - x\right) = \sec(x)$

$$40. \sec\left(\frac{\pi}{2} - x\right) = \csc(x)$$

Write the expression as a single sine.

$$41. -\sqrt{3}\sin(x) + \cos(x)$$

$$42. \sin(x) - \cos(x)$$

$$43. \sin(2x) + \sqrt{3}\cos(2x)$$

Answer Sheet

1		23	
2		24	
3		25	
4		26	
5		27	
6		28	
7		29	
8		30	
9		31	use your own paper
10		32	use your own paper
11		33	use your own paper
12		34	use your own paper
13		35	use your own paper
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