Merit Workshop 1 - 24 August, 2005

Sometimes we will begin with a little information that you will need for your next Math 242 lecture.

1. **Cosine Rule:** \(a^2 = b^2 + c^2 - 2bc \cos A\)

![Diagram of a triangle with sides labeled a, b, and c, and angles A, B, and C.]

What are \(a\) and \(A\)? Many different angles have the same cosine (examples?) - how do you know that you have the right one?

2. List 5 things best described by using scalars and 5 things best described by using vectors.

3. Use vectors to describe the position of some of the objects in the Merit workshop room.

4. A line segment starts at \((2, -7)\) and has midpoint \((5, -1)\). What is the other endpoint of the line segment?

5. A line segment starts at \((1, 3)\) and ends at \((4, 7)\). Where would it end if it was 5 times longer?

6. Given the vectors \(\mathbf{b} = <1, 1>\) and \(\mathbf{c} = <-1, 2>\), for the following vectors \(\mathbf{a}\), find \(s\) and \(t\) such that \(\mathbf{a} = s\mathbf{b} + t\mathbf{c}\).
   
   (a) \(\mathbf{a} = <0, 6>\)
   
   (b) \(\mathbf{a} = <-3, 6>\)
   
   (c) \(\mathbf{a} = <0, 0>\)
   
   (d) Choose your own vector \(\mathbf{a}\).
   
   (e) What does this tell you about any vector \(\mathbf{a}\) in \(\mathbb{R}^2\)?

7. If \(a, b\) and \(c\) are the vertices of a triangle, find \(\vec{ab} + \vec{bc} + \vec{ca}\).

8. What is the domain of \(\log(x^2 - y^2 - 1)\)?

9. How does the function \(f(x, y) = x^2 + y^2\) behave?

**Warm-Up problems for next week**

1. What is the distance between \((-1, 3, 7)\) and \((2, -1, 19)\)?

2. What is \(\|7 \mathbf{i} + 9 \mathbf{j} - 9 \mathbf{k}\|\)?