

Math 185 – Quiz #1

October 12, 2007

Name: _____

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Total: 40 points

1. Which of the following are vectors or scalars? Write “V” for vector, “S” for scalar, and “neither” if the quantity isn’t a vector or a scalar. (4 points)

- a) 15 m/s north _____
- b) 15° above the horizontal _____
- c) 8 _____
- d) 14.53 seconds _____

2. Vector **A** is in the + z-direction, while vector **B** is in the + y-direction. (1 point)

What is the direction of $\mathbf{A} \times \mathbf{B}$? _____

3. Calculate the component form of the following vector. Give exact answers in **ijk** notation and show your work. (4 points)

$$\mathbf{F} = 12 \text{ at } 150^\circ$$

4. Calculate the magnitude of the vector $\mathbf{R} = -5\mathbf{i} - 2\mathbf{j} + 4\mathbf{k}$ using the dot product. Show your work and give an exact answer. (3 points)

5. Consider the vectors $\mathbf{A} = \mathbf{i} - \mathbf{k}$, $\mathbf{B} = \mathbf{j} + \mathbf{k}$ (4 points)

a) Find the dot product $\mathbf{A} \cdot \mathbf{B}$, showing your work.

b) Are these two vectors perpendicular? Explain.

6. Calculate the magnitude and direction of the following vector. Round your answers to the nearest decimal and show your work. (3 points)

$$B_x = -10.2, B_y = 14.3$$

7. Calculate the cross product $\mathbf{A} \times \mathbf{B}$ for the following vectors. Show your work. (3 points)

$$\mathbf{A} = -5 \mathbf{i} - 2 \mathbf{j} + 3 \mathbf{k}, \mathbf{B} = \mathbf{j}$$

8. Solve the following systems of equations, using any **algebraic** method and showing your work (6 points)

a)
$$\begin{cases} -2x + 3y = 6 \\ 3x - 5y = -11 \end{cases}$$

b)
$$\begin{cases} y = 5 + \frac{1}{2}x \\ 2x - 4y = 7 \end{cases}$$

9. Write the augmented matrix associated with the following system of equations. Then write the reduced-row echelon form of the matrix, and finally write the solution to the system as an ordered triple. (3 points)

$$\begin{cases} 3x - 4y + z = 19 \\ 2x + 4y + z = 0 \\ x + 5z = 13 \end{cases}$$

10. For the following two word problems, write out the system of equations, solve using any method (if using a calculator, write out the associated matrices), and state your answer in sentence form.
- a) At the neighbourhood café, a coffee and a doughnut together cost \$2.75. If the price of the doughnut is twenty-five cents less than three times the price of the coffee, how much does the café charge for each item? (4 points)
- b) Every year, the Times Colonist holds a big book sale for charity. All hardcover books sell for the same price, all paperbacks sell for another price, and all magazines have a third price. Edgar buys three hardcovers, one paperback, and four magazines for \$4.50. Cynthia buys four paperbacks and two magazines for \$2.50. Herbert buys one hardcover, two paperbacks, and two magazines for \$2.50. How much must I pay in total if I want to buy one hardcover, one paperback, and one magazine? (5 points)