

Physics 2314, Homework #1 (due 1/24)

Multiple choice questions

- M1 Vector **A** has a magnitude of 2 m, and vector **B** has a magnitude of 5 m. Mark all possible values for the magnitude of **A** – **B**.
- A. –3 m
 - B. 0
 - C. 5 m
 - D. 10 m
- M2 Which of the following is true? (There can be more than one correct answer.)
- A. Position is the first derivative of velocity.
 - B. Velocity is the first derivative of position.
 - C. Acceleration is the first derivative of velocity.
 - D. Acceleration is the second derivative of velocity.
 - E. Position is the second derivative of acceleration.
- M3 A particle is moving along the x axis. Its position is given by the equation $x = t^3$, where t is in seconds, and x is in meters. What can you say about its acceleration at $t = 1$ s?
- A. The acceleration is zero (a particle under constant velocity).
 - B. The acceleration is positive.
 - C. The acceleration is negative.

Problems

P1 Given two vectors $\mathbf{A} = \mathbf{i} + 2\mathbf{j}$ and $\mathbf{B} = 2\mathbf{i} + 2\mathbf{j}$, calculate (a) $\mathbf{A} + \mathbf{B}$, (b) $\mathbf{A} - \mathbf{B}$, (c) $|\mathbf{A} + \mathbf{B}|$, (d) $|\mathbf{A} - \mathbf{B}|$, (e) directions of $\mathbf{A} + \mathbf{B}$ and $\mathbf{A} - \mathbf{B}$.

P2 Given vectors $\mathbf{A} = \mathbf{i} + 2\mathbf{j}$, $\mathbf{B} = 3\mathbf{i} + \mathbf{j}$, $\mathbf{C} = -\mathbf{i} + 3\mathbf{j}$, find numbers a and b such that a linear combination of vectors \mathbf{A} and \mathbf{B} with coefficients a and b is equal to \mathbf{C} :

$$a\mathbf{A} + b\mathbf{B} = \mathbf{C}$$

P3 (a) A particle moves along the x axis. Its position is given by the equation

$$x = 1 + 2t + t^2,$$

where x is in meters and t is in seconds. Find position, velocity, and acceleration of the particle at $t = 2$ s.

(b) A particle moves along the x axis. Its position is given by the equation

$$x = 1 + 2t,$$

where x is in meters and t is in seconds. Find position, velocity, and acceleration of the particle at $t = 2$ s.

P4 A particle is moving with a constant acceleration $a_x = 2 \text{ m/s}^2$ from point $x_i = 1$ m to point $x_f = 3$ m. At point x_f the velocity of the particle is 3 m/s. What was the velocity of the particle at point x_i ?