

Total points: 40. Total time: 1.5 hr. Show all your work.

You must write down your answers with units in the **Ans.** boxes

1. (4 pt) Sound travels at 343 m/s. How many inches does sound travel in a fortnight (old-fashioned word for 14 days)?

Ans.

2. (12 pt) For the vectors $\vec{A} = (-4, -5)$ cm and $\vec{B} = (-7, 4)$ cm given in Fig. 1, determine

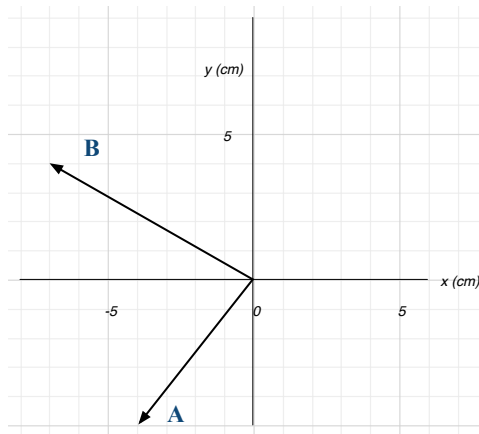


Figure 1: Two Vectors (Problem 2)

- (a) (6 pt) the magnitude and direction of their vector sum, $\vec{A} + \vec{B}$.

Ans.

Ans.

- (b) (6 pt) their dot product, $\vec{A} \cdot \vec{B}$.

Ans.

3. (4 pt) Determine the vector $\vec{L} = \vec{r} \times \vec{p}$, where $\vec{r} = (2, 7, 0)$ and $\vec{p} = (1, 2, 0)$.

Ans.

4. (6 pt) A bus accelerates at $1.5 \frac{m}{s^2}$ from rest for 12 s. It then travels at constant velocity for 25 s. How far does the bus travel?

Ans.

5. (6 pt) A stone is thrown downward from the top of a cliff with an initial velocity of 7.0 m/s. It is seen to hit the ground below after 1.35 s. How high is this cliff?

Ans.

6. (4 pt) A particle is moving in one dimension. If its velocity as a function of time is shown in Figure 2, determine the displacement of the particle in the interval 3 to 8 s;

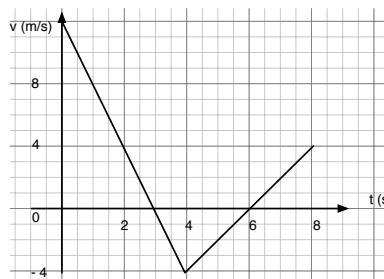


Figure 2: Velocity vs. Time

Ans.

7. (4 pt) The acceleration of a bus is given by $a = (1.2 \text{ m/s}^2)e^{-\alpha t}$, where $\alpha = 1.2 \text{ (1/s)}$. If the bus's velocity at time $t = 1.0 \text{ s}$ is $v = 4.0 \text{ m/s}$, determine its velocity at $t = 2.0 \text{ s}$.

Ans.