Midterm 2 for Calculus-Based Physics-1: Mechanics (PHYS150-01)

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1 Vectors and Newton's Laws

1. Let $\vec{F}_1 = -\frac{3}{2}\hat{x} + 2\hat{y}$ N, and $\vec{F}_2 = -2\hat{x} + \frac{3}{2}\hat{y}$ N. a) Give the magnitude of each force. b) What is the net force? c) What is the angle between these two forces?

2. Imagine you are sitting in an airplane that has just lifted off with an acceleration vector 45 degrees with respect to horizontal. Draw a free-body diagram corresponding to you, showing all forces acting on you.

3. The plane reaches a constant altitude and begins flying at a constant speed. Then, the plane pilot banks in a turn, introducing centripetal acceleration. Draw a free-body diagram corresponding to you, showing all forces acting on you.

2 Newton's First, Second, and Third Law

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