ENG35: Statics

HW # 1, Due: Friday 10Oct2025, by midnight on Canvas.

Problem:

1. Perform the following unit conversions:

   - 1 lb = _____ N
   - 1 N = _____ lb
   - 1ft = _____ m = _____ cm = _____ mm
   - 1 m = _____ ft = _____ in
   - 600 lb/ft^2 = _____ kN/m^2
   - 400 kN/m^2 = _____ lb/ft^2

2. Determine the dimensions of constants A and B in the dimensionally homogeneous equation:

$$v^2 = Ax^3 + Bvt$$

   The dimensions of variables are $[v] = [L/T]$, $[x] = [L]$, and $[t] = [T]$.

3. Using vectors given in plots on next page, find solutions numerically/analytically, Check you work graphically. Choose two examples and ask ChatGPT to solve problems.

   (a) vector $\vec{A} + \vec{B}$
   (b) vector $\vec{A} + \vec{D}$
   (c) vector $0.5\vec{A}$
   (d) vector $0.3\vec{A} + \vec{C}$
   (e) vector $0.3(\vec{A} + \vec{C})$
   (f) vector $\vec{A} + \vec{D} - \vec{C} + \vec{B}$
   (g) scalar $\vec{A} \cdot \vec{C}$
   (h) angle between $\vec{A}$ and $\vec{B}$; $\vec{A}$ and $\vec{C}$; and $\vec{A}$ and $\vec{D}$.

   For graphical solution use next page.

4. (Extra Credit) Write a program/subroutine/function that can

   (a) add any number of vectors, and any of these vectors can be scaled/multiplied by a scalar
   (b) find an angle between two vectors
   (c) calculate a dot product between two vectors

   Use any programming language you are familiar with. Please provide plenty of comments in your program source code so that an outsider (me) can understand what is going on. Attach your program source to the HW file in Canvas.