**Project 3 Instructions**

Initially you will set up:

* six 2-dimensional vectors to store all the force vectors (weight, 4 additional forces, the net force). For example, vector[0,0] and vector [1,0] will contain the x-component and the y-component of the weight vector; vector[0,1] and vector[1,1] will contain the x-component and the y-component of the first added force vector, etc.
* a Boolean array of size 6 used to indicate whether or not each of the six vectors have been used.  
  Initially they are all set to false. (Used later when drawing.)

Whenever a text box is changed:

* unless you are clearing everything (i.e., clicked the Clear button), update everything.

To update everything:

* calculate the weight vector and store its components in vector[0,0] and vector[1,0]. Set used\_vector[0] to true.
* for each additional forces:
  + see if both text boxes are non-empty. If so,
    - calculate the components of this force and store in vector[0,k] and vector[1,k].
    - set used\_vector[k] = true
  + else
    - set used\_vector[k] = false
* calculate the net force as the sum of all the used forces and store in vector[0,5] and vector[1,5].
* use this command to update the graphics:  
   pnlDrawing->Invalidate();
* determine the net force in polar coordinates (making sure the angle is positive) and display it.
* calculate the mass from the weight
* calculate the acceleration and display it
* calculate the displacement and display it

Within pnlDrawing\_Paint(…):

* determine the maximum length (in pixels) as one-half of the panel width (less 10 to leave some space).
* set a Point, say centrePoint, to have coordinates at the centre of the panel.
* determine the maximum (in absolute value) of the x- and y-components of all the used force vectors. Use this to determine a pixel scaling factor (maximum length (pixels) / maximum xy value)
* Start drawing:
  + first draw a rectangle to represent the weight. (Code included in the skeleton.)
  + for each used vector, determine the end point: calculate the x-pixel value as vector[0,k]\*(pixel scaling factor) + centreX, and the y-pixel value as panel\_height – (vector[1,k]\*(pixel scaling factor) + centreY).
  + you will then draw an arrow from the centre point to this end point. Draw in its assigned colour as shown in the skeleton.