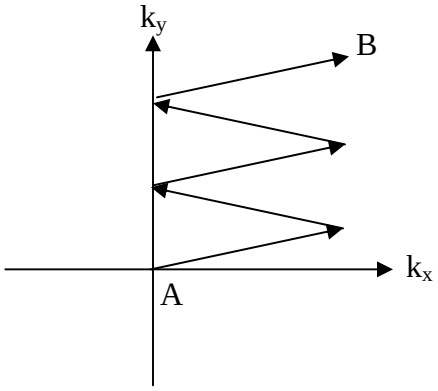
MRI Primer, Exercise #4
Due 22/Dec/2009

1. **k-Space: deducing the gradients**. In class, we've encountered the variable $\mathbf{k}(t) = \gamma \int_0^t \mathbf{G}(t')dt'$, i.e., the area under the gradient curve. Plot (schematically, in arbitrary units) the x and y gradients (that is, $G_x(t)$ and $G_y(t)$) which would give rise to the following path through k-space, assuming that your initial point is A and final point is B (assume the path is traced continuously and evenly):



2. **k-Space: deducing k**. In the previous question you were given **k**(t) and were asked to schematically plot **G**(t). Now we're going to reverse the question: you're told that the x and y gradients are going to be varied as

$$\mathbf{G}(t) = \left(G_0 \sin(\omega t), G_0\right)$$

(we'll be working in just 2 dimensions, x & y, for simplicity).

   a. Plot $G_x(t)$ and $G_y(t)$ schematically.
   b. Compute **k**(t).
   c. Plot $k_x(t)$ and $k_y(t)$ schematically.
   d. Plot the trajectory **k**(t) in the k_x-k_y plane (as, for example, I've plotted in the first question).