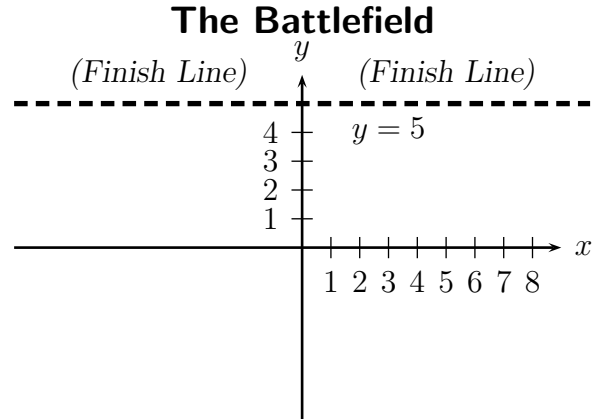# Worksheet Revenge is a Dish Best Served Cold

1. (This problem appeared on a Winter, 2003 Math 116 exam) The newest FOX reality show, "BattleBugs: Clash of the Beetles" begins (at $t = 0$) with eight assorted insects placed randomly on a large mat (the "battlefield", pictured here), on which is marked a "finish line". The producers hoped that the bugs would battle to be first to cross the finish line, but instead they wander around, each according to its nature. The motion of each bug is described by the equations below. Both x and y are measured in inches.

The Battlefield

Hercules Beetle	Ladybug	Tiger Beetle	Longhorned Beetle
$x(t) = \cos(t/2)$ $y(t) = \sin(t/2)$	$x(t) = e^{-t}$ $y(t) = e^{-2t}$	$x(t) = 1 + t$ $y(t) = -1 + 8t$	$x(t) = 3 + t$ $y(t) = 4 - t$
Dung Beetle	**Scarab**	**June Beetle**	**African Ground Beetle**
$x(t) = t$ $y(t) = -2$	$x(t) = 2 - 7t$ $y(t) = -1 - 7t$	$x(t) = 0$ $y(t) = -1$	$x(t) = \sin(t)$ $y(t) = \cos(t)$

Which bug (or bugs)...

(a) move repetitively?

(b) begin closest to the finish line?

(c) move fastest?

(d) will move very slowly (or not at all), in the long run?

(e) will reach the finish line first?

(f) gets the dizziest?