

Name:

Quiz #5

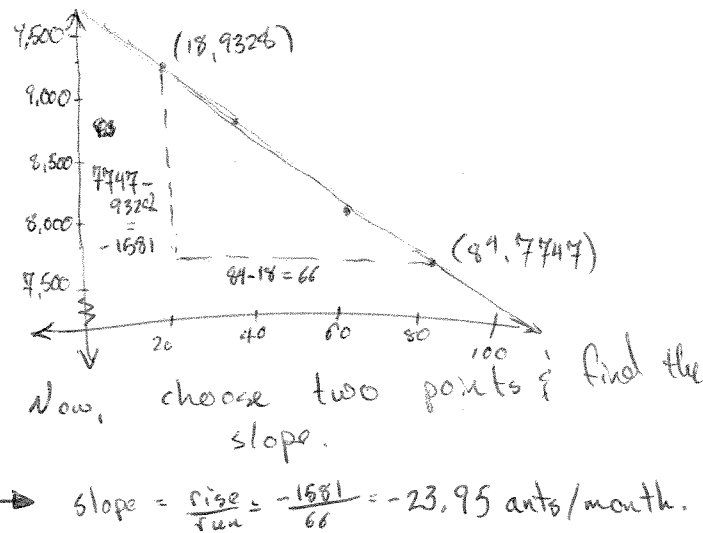
Solve the following problems. Show all of your work and make it clear what your answer is.

1. Your prize-winning ant colony is in a state of emergency!!! The population is declining at a linear rate and there is nothing you can do about it. Population counts since the beginning of the year are recorded in the table below.

days since start of year	18	34	62	84
number of ants left	9328	8872	8074	7747

(a) Find the linear equation that describes your ant colony population as a function of the number of days since the beginning of the year. *First, a quick sketch of the data:*

$y = mx + b$   
 Found  $m$  here  
 $y = -23.95x + b$   
 Plug in a point - say,  $(18, 9328)$ .  
 $9328 = -23.95 \cdot 18 + b$   
 $9328 + 23.95 \cdot 18 = b$   
 $b = 9759.18 \text{ ants}$   
 So  
 $y = -23.95x + 9759.18$



(b) How many ants did you have at your New Year's party (day #0)?

$y = -23.95x + 9759.18$   
 ← plug in 0 for  $x$   
 $y = -23.95 \cdot 0 + 9759.18$   
 $= 9759.18$ , or about 9760 ants

(c) When will your entire ant colony be dead?

That's when we have 0 ants.

$$0 = -23.95x + 9759.18 \dots$$

$$-9759.18 \dots$$

$$-9759.18 = -23.95x$$

$$\div 23.95x$$

$$x = \boxed{407.4 \text{ days after New Years}}$$

(d) The ant colony fair requires a minimum population of 1000. When will your ant colony become ineligible to defend its 1st prize at the ant colony fair?

$$1000 = -23.95x + 9759.18$$

$$-9759.18$$

$$-8759.18 = -23.95x$$

$$\div 23.95$$

$$365.66 = x$$

$$x = \boxed{365.66 \text{ days, or about 1 year}}$$