Mathematics 122

Quiz #2 Name: Key

You must show your work to get full credit.

(1) A town in North Dakota had a population of 20,000 in 2000 and has been decreasing at a rate of 800 people per year.

(a) Give a formula for the population P in terms of the number of years, t, since 2,000.

$P = 20{,}000 - 800t$

(b) In what year will the population become 15,000?

Solve $20{,}000 - 800t = 15{,}000$

$800t = 5{,}000$

$t = 5{,}000/800 = 6.25$

same time in 2006

So

(2) Two variables are related by

p	5	10	15	20
q	12	16	20	24

(a) Explain why this relation is linear for the values shown. (This will involve writing at least one English sentence, subject and verb included. A point will be taken off if there is just a bunch of numbers.)

slope at ① $= \frac{\Delta p}{\Delta q} = \frac{10-5}{16-12} = \frac{5}{4}$

slope at ② $= \frac{\Delta p}{\Delta q} = \frac{15-10}{20-16} = \frac{5}{4}$

slope at ③ $= \frac{\Delta p}{\Delta q} = \frac{20-15}{24-20} = \frac{5}{4}$

It is linear as the slopes are constant

(b) Find q as a function of p.

$\frac{\Delta p}{\Delta q} = \frac{p-5}{q-12} = \frac{5}{4}$

$5q - 60 = 4p - 20$

$5q = 4p + 40$

$q = \frac{4}{5}p + 8$

$q = \frac{4}{5}p + \frac{40}{5} = \frac{4}{5}p + 8$

(c) What is the value of q when $p = 22$? $q =$

If $p = 22$

$q = \frac{4}{5}(22) + 8$

$= \frac{88}{5} + \frac{40}{5}$

$= \frac{128}{5}$

$\frac{128}{5} = 25.6$