

Mathematics 172

Quiz #2

You must show your work to get full credit.

A population of weeds in a lawn grows exponentially. If it starts with 3 weeds, and after two months has 12 weeds, then find (a) A formula for N_t , the number of weeds after t months, (b) the per-month grow rate r , and (c) the doubling time.

Solution for (a) and (c): As it is exponential growth, it is the form

$$N_t = N_0(1 + r)^t.$$

We know that $N_0 = 3$ and the formula becomes

$$N_t = 3(1 + r)^t.$$

But we also know that $N_2 = 12$, this gives

$$3(1 + r)^2 = 12$$

that is

$$(1 + r)^2 = 4$$

and taking square roots gives

$$(1 + r) = \sqrt{4} = 2.$$

Therefore we have

$$N_t = 3(2)^t \quad \text{and} \quad r = 1.$$

Solution for (b): To find the doubling time we need to solve $N_t = 2N_0$ for t . In our case this becomes

$$3(2)^t = (2)(3).$$

That is

$$2^t = 2$$

which clearly has the solution

$$t_{\text{doubling}} = 1.$$