

Mathematics 122

Quiz #5

Name: Key

You must show your work to get full credit.

- (1) The doubling time of a species of bacteria is 30 minutes (= .5 hours). A petri starts with 100 bacterium.

(a) Give a form for number of bacterium after t hours?

$$P(t) = 100a^t$$

$$P(.5) = 100a^{.5} = 200$$

$$\text{so } a^{.5} = 2$$

$$a = 2^2 = 4$$

$$P(t) = \underline{100(4)^t}$$

- (b) How many bacterium are there after one day (24 hours)?

Number after 24 hours $\underline{2.8147 \times 10^{16}}$

$$P(24) = 100(4)^{24} =$$

- (2) If you wish to have \$20,000 in 15 years, then how much do you need to invest now at 8% interest compounded continuously to achieve your goal of \$20,000?

$$P(t) = P_0 e^{.08t}$$

we want P_0 so that

$$P(15) = P_0 e^{(.08)(15)} = 20,000$$

$$P_0 = \frac{20,000}{e^{(.08)(15)}} = \underline{6023.88}$$