Math 1311 Popper 16

Find the values of certain numbers associated with the logistic formula

$$N = \frac{K}{1 + be^{-rt}}$$

$b = \frac{K}{N(0)} - 1$

Question 1: Find *b* if the optimum yield level is 400 and the initial population is 200.

a) 2
b) 3
c) 4
d) 5

$OYL = \frac{K}{2}$ $\quad 2 \cdot 400 = \frac{K}{2} \cdot 2$ $\quad K = 800$, $N(0) = 200$ $\quad b = \frac{800}{200} - 1 = 4 - 1 = 3$

Question 2: Find the optimum yield level if *b*=5 and the initial population is 150.

a) 250
b) 350
c) 450
d) 550

$b = 5$, $N(0) = 150$ $\quad 5 = \frac{K}{150} - 1$ $\quad +1 \quad +1$ $\quad 1506 = \frac{K}{150} \cdot 150$ $\quad K = 900$

$OYL = \frac{K}{2} = \frac{900}{2} = 450$

Question 3: Find the initial population if the carrying capacity is 1000 and *b*=3.

a) 250
b) 350
c) 450
d) 550

$b = \frac{K}{N(0)} - 1$ $\quad K = 1000$, $b = 3$ $\quad N(0) = ?$

$3 = \frac{1000}{N(0)} - 1$ $\quad +1 \quad +1$ $\quad \frac{4}{1} = \frac{1000}{N(0)}$

$\frac{4N(0)}{4} = \frac{1000}{4}$ $\quad N(0) = 250$

Question 4: The *r* value is 0.3 per year. What percentage growth rate would the population show in the absence of constraints?

a) 15%
b) 25%
c) 35%
d) 45%

$a = e^r$ $\quad r = \ln a$

$r = .3$ $\quad a = e^{.3}$ $\quad a = ?$ $\quad a = 1.35$ $\quad 1.35 - 1 = .35$ $\quad .35(100) = 35\%$

Question 5: The *r* value is 0.7 per year. What percentage growth rate would the population show in the absence of constraints?

a) 101%
b) 201%
c) 301%
d) 401%

$r = .7$ $\quad a = e^{.7}$ $\quad a = ?$ $\quad a = 2.01$ $\quad 2.01 - 1 = 1.01$ $\quad 1.01(100) = 101\%$