Question 1.

Suppose that the number of critters is given by $P(t) = 42 \cdot 3^t$. Find $P(t+2)/P(t)$.

A 9

B 42

C 3

D 6

E Nope.

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We have

$$\begin{aligned} \frac{P(t+2)}{P(t)} &= \frac{42 \cdot 3^{t+2}}{42 \cdot 3^t} \\ &= \frac{42 \cdot 3^t \cdot 3^2}{42 \cdot 3^t} \\ &= 9. \end{aligned}$$

Question 2.

Suppose that we invest \$500 at an annual interest rate of 8% compounded twice a year. Give V, the value of the investment after 12 years.

A $V(t) = 500 \cdot 1.08^{12}$

B $V(t) = 500 \cdot 1.04^{12}$

C $V(t) = 500 \cdot 1.04^{24}$

D $V(t) = 500 \cdot 1.08^{24}$

E $V(t) = 250 \cdot 1.12^{8}$

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We earn 4% interest in 24 compoundings. The value is $500 \cdot 1.04^{24}$. After t years, there will be $2t$ compoudings to give a value of $V(t) = 500 \cdot 1.04^{2t}$.

Question 3.

Suppose a population triples every 6 hours and at 12 noon, there are 300 critters. Find the population t hours after 12 noon.

A $P(t) = 300 \cdot 3^{6t}$

B $P(t) = 300 \cdot 6^{t/3}$

C $P(t) = 300 \cdot 6^{t/6}$

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We look for a model of the form $P(t) = A \cdot 3^{t/a}$. $P(0) = 300$ so $A = 30$).
If t increases by 6, the exponent increases by 1, so we want $a = 6$.
We can check for answer E, $P(t+6) = 300 \cdot 3^{(t+6)/6} = 3P(t)$.

Question 4.

Solve the equation for k.

$$\ln(2 + k) = 1$$

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B $2 - e$

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We apply the exponential function to both sides to obtain $2 + k = e^1$ or $k = e - 2$.