1. (2 points) Suppose \( P(t) = 80(0.9)^t \) represents some population \( t \) years from now. Which one of the following statements is true?

(a) The population will increase by 10% per year.
(b) The population will increase by 10 people per year.
(c) The population will increase by 20% per year.
(d) The population will increase by 20 people per year.
(e) The population will increase by 80% per year.
(f) The population will increase by 80 people per year.
(g) The population will increase by 90% per year.
(h) The population will increase by 90 people per year.
(i) The population will decrease by 10% per year.
(j) The population will decrease by 10 people per year.
(k) The population will decrease by 20% per year.
(l) The population will decrease by 20 people per year.
(m) The population will decrease by 80% per year.
(n) The population will decrease by 80 people per year.
(o) The population will decrease by 90% per year.
(p) The population will decrease by 90 people per year.

2. (2 points) Given that \( 35 = 10(7)^t + 5 \). Without using a calculator find the exact value of \( t \).

\[
\begin{align*}
35 &= 10(7)^t + 5 \\
30 &= 10(7)^t \\
3 &= 7^t \\
\ln(3) &= \ln(7)^t \\
\ln(3) &= t \cdot \ln(7) \\
t &= \frac{\ln(3)}{\ln(7)}
\end{align*}
\]
3. (3 points) In the year 1980 a town’s population was 20,000. In the year 2000 its population was 40,000. If the population grew exponentially, then what was the annual percentage increase over this period?

\[ P = P_0 \times (q)^t \]

\[ P = 20000 \times (q)^t \]

\[ 40000 = 20000 \times (q)^{20} \]

\[ q^{20} = 2 \]

\[ q = 2^{\frac{1}{20}} \]

\[ q \approx 1.035 \]

\[ P = 20000 \times (1.035)^t \]

\[ \text{Annual Increase} = 3.5\% \]

4. (3 points) A product costs $200 today but the cost will be reduced by 4% per day. Find a formula for \( A(t) \), the cost in dollars of the product \( t \) days from now.

\[ A(t) = 200 \times (0.96)^t \]