General Algebra II Worksheet #10 Unit 12 Selected Solutions

Solve the following problems. Show your process neatly organized. Round your answers to the nearest tenth of a year.

1. $3000 is invested in an account that pays interest at an annual rate of 2.5% compounded quarterly. How long will it take for the value of the account to double?

$A = P(1 + \frac{R}{N})^{Nt}$ $\quad 6000 = 3000(1 + \frac{0.025}{4})^{4t}$

$A = \$6000$ $\quad (1 + \frac{0.025}{4})^{4t} = 2$

$P = \$3000$

$R = 0.025$ $\quad \text{Log}(1 + \frac{0.025}{4})^{4t} = \text{Log } 2$

$N = 4$ $\quad 4t\text{Log}(1 + \frac{0.025}{4}) = \text{Log } 2$

$t = ??$ $\quad t = \dfrac{\text{Log } 2}{4\text{Log}(1 + \frac{0.025}{4})} \approx 27.8$

It will take about 27.8 years.

6. $500 is invested in an account that pays interest at an annual rate of 5% compounded continuously. How long will it take for the value of the account to reach $1500?

$A = Pe^{Rt}$ $\quad 1500 = 500e^{0.05t}$

$A = \$1500$ $\quad e^{0.05t} = 3$

$P = \$500$ $\quad \ln(e^{0.05t}) = \ln 3$

$R = 0.05$ $\quad 0.05t = \ln 3$

$t = ??$ $\quad t = (\ln 3) \div 0.05 \approx 22.0$

It will take about 22 years.

8. Money is invested in an account that pays interest at an annual rate of 1.5% compounded daily. How long will it take for the value of the account to double?

$A = P(1 + \frac{R}{N})^{Nt}$ $\quad 2P = P(1 + \frac{.015}{365})^{365t}$

$A = 2P$ $\quad (1 + \frac{.015}{365})^{365t} = 2$

$P = P$

$R = 0.015$ $\quad \text{Log}(1 + \frac{.015}{365})^{365t} = \text{Log } 2$

$N = 365$

$t = ??$ $\quad 365t\ \text{Log}(1 + \frac{.015}{365}) = \text{Log } 2$

$t = \dfrac{\text{Log } 2}{365\text{Log}(1 + \frac{.015}{365})} \approx 46.2$

It will take about 46.2 years.

9. Money is invested in an account that pays interest at an annual rate of 4% compounded continuously. How long will it take for the value of the account to double?

$A = Pe^{Rt}$ $\quad 2P = Pe^{0.04t}$

$A = 2P$ $\quad e^{0.04t} = 2$

$P = P$ $\quad \ln(e^{0.04t}) = \ln 2$

$R = 0.04$ $\quad 0.04t = \ln 2$

$t = ??$ $\quad t = (\ln 2) \div 0.04 \approx 17.3$

It will take about 17.3 years.