Algebra II Worksheet #5 Unit 11 Selected Solutions

Solve for x. Express irrational solutions rounded to the nearest hundredth.

1. $4^{(x-3)} = 32$

$(2^2)^{(x-3)} = 2^5$

$2^{(2x-6)} = 2^5$

$2x - 6 = 5$

$2x = 11$

$x = 5.5$

4. $3^{(2x-1)} = 75$

$\text{Log}(3^{(2x-1)}) = \text{Log } 75$

$(2x-1)\text{Log } 3 = \text{Log } 75$

$2x\text{Log } 3 - \text{Log } 3 = \text{Log } 75$

$2x\text{Log } 3 = \text{Log } 75 + \text{Log } 3$

$$x = \frac{\text{Log } 75 + \text{Log } 3}{2\text{Log } 3} \approx 2.46$$

5. $\text{Log}_3 x = 2$

$x = 3^2$

$x = 9$

9. $\text{Log}_2 x = 2.75$

$x = 2^{2.75} \approx 6.73$

11. $1000 is invested in an account that pays interest at an annual rate of 6% compounded monthly. How long will it take for the value of the account to double?

$A = P(1 + \frac{R}{N})^{Nt}$

$A = \$2000$

$P = \$1000$

$R = 0.06$

$N = 12$

$t = ??$

$2000 = 1000(1 + \frac{0.06}{12})^{12t}$

$1.005^{12t} = 2$

$12t\text{Log } 1.005 = \text{Log } 2$

$$t = \frac{\text{Log } 2}{12\text{Log } 1.005} \approx 5.4$$

It will take about 5.4 years.

13. $600 is invested in an account that pays interest at an annual rate of 7% compounded continuously. How long will it take for the value of the account to double?

$A = Pe^{Rt}$

$A = \$1200$

$P = \$600$

$R = 0.07$

$t = ??$

$1200 = 600e^{0.07t}$

$e^{0.07t} = 2$

$0.07t = \ln 2$

$t = (\ln 2) \div 0.07 \approx 9.9$

It will take about 9.9 years.

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

$A = P(1 + \frac{R}{N})^{Nt}$

$A = 2P$

$P = P$

$R = 0.04$

$N = 365$

$t = ??$

$2P = P(1 + \frac{0.04}{365})^{365t}$

$(1 + \frac{0.04}{365})^{365t} = 2$

$365t\ \text{Log}(1 + \frac{0.04}{365}) = \text{Log } 2$

$$t = \frac{\text{Log } 2}{365\text{Log}(1 + \frac{0.04}{365})} \approx 17.3$$

It will take about 17.3 years.