Algebra 2 - Extra Midterm Review Name Key 2015-16 Hour______

For #1-2, solve each equation and check for extraneous solutions.

1. $\log_x 81 = 4$

$x^4 = 81$

$x = \pm\sqrt[4]{81}$

$x = \pm 3$

~~x~~ $x=3$ is extraneous

$\boxed{x=3 \text{ is the only solution}}$

2. $\frac{4}{x+4} - \frac{1}{x-2} = \frac{12}{x^2+2x-8}$ LCD $= (x+4)(x-2)$

$(x+4)(x-2)$

$(x+4)(x-2)\left(\frac{4}{(x+4)} - \frac{1}{(x-2)}\right) = \left(\frac{12}{(x+4)(x-2)}\right)(x+4)(x-2)$

$4(x-2) - 1(x+4) = 12$

$4x - 8 - x - 4 = 12$

$3x - 12 = 12$

$3x = 24$

$\boxed{x = 8}$

3. The equation $\frac{2x}{x+2} - 4 = \frac{6}{x}$ has exactly 2 solutions. What is the sum of the solutions for this equation?

LCD $= x(x+2)$

$x(x+2)\left(\frac{2x}{(x+2)} - 4\right) = \left(\frac{6}{x}\right)\cdot x(x+2)$

$x \cdot 2x - 4\cdot x(x+2) = 6(x+2)$

$2x^2 - 4x(x+2) = 6x+12$

$2x^2 - 4x^2 - 8x = 6x + 12$

$-2x^2 - 8x = 6x + 12$

$0 = 2x^2 + 14x + 12$

$0 = 2(x^2 + 7x + 6)$

$0 = 2(x+6)(x+1)$

$x = -6, -1$

$\boxed{\text{sum} = -6 + -1 = -7}$

For #4-5, simplify each expression.

4. $\frac{3x}{x-5} - \frac{2}{x^2-25}$ LCD $= (x+5)(x-5)$

$(x+5)(x-5)$

$= \frac{(x+5)}{(x+5)} \cdot \frac{3x}{(x-5)} - \frac{2}{(x+5)(x-5)}$

$= \frac{3x(x+5) - 2}{(x+5)(x-5)}$

$\boxed{= \frac{3x^2 + 15x - 2}{(x+5)(x-5)}}$ $x \neq -5, 5$

5. $\frac{6}{x+4} - \frac{3}{1}$

$= \frac{6}{(x+4)} - \frac{3\cdot(x+4)}{1\cdot(x+4)}$

$= \frac{6 - 3(x+4)}{(x+4)}$

$= \frac{6 - 3x - 12}{(x+4)}$

$= \frac{-3x-6}{x+4} = \frac{-3(x+2)}{x+4}$ $x \neq -4$

6. Condense the logarithmic expression given below.

$\log 3 + \frac{1}{2}\log x - \log 5$

$= \log 3 + \log x^{1/2} - \log 5$

$= \log 3x^{1/2} - \log 5$

$= \boxed{\log \frac{3x^{1/2}}{5}}$

7. You make a one-time deposit of $15,000 into a mutual fund investment. Your financial advisor informs you that this mutual fund has attained a 9.5% average annual return. compounded quarterly Suppose you want to get out $100,000 from this investment. How many years of investing are required?

$A = P(1+\frac{r}{n})^{nt}$

$100{,}000 = 15{,}000(1+\frac{0.095}{4})^{4t}$

$\frac{100{,}000}{15{,}000} = (1.02375)^{4t}$

$20/3$

$4t = \log_{1.02375}(\frac{20}{3})$

$t = \frac{\log_{1.02375}(\frac{20}{3})}{4}$

$\boxed{t \approx 20 \text{ years}}$

8.

Newton's Law of Cooling ($T = S + (T_0 - S)e^{-kt}$) states that the difference in the temperature of a warm body (or drink) and its surroundings changes exponentially.

T-Current Temperature S-Surrounding Temperature T_0-Initial Temperature k-Constant t-Time (hrs.)

Tonight is fajita night! The freezer in your home is set to $0^\circ F$. Last night your Mom took the chicken out of the freezer and put it in the refrigerator to defrost it. The refrigerator is set at $35^\circ F$. When your Mom goes to start making dinner at 4:30 pm she finds that the temperature of the chicken is now $23.8^\circ F$. The cooling constant "k" is 0.0565.

Determine the total amount of time that the chicken was in the fridge.

$T = S + (T_0 - S)e^{-kt}$

$23.8 = 35 + (0-35)e^{-0.0565t}$

$-11.2 = -35e^{-0.0565t}$

$\frac{11.2}{35} = e^{-0.0565t}$

$-0.0565t = \ln(\frac{11.2}{35})$

$t = \frac{\ln(\frac{11.2}{35})}{-0.0565}$

$t = 20.2 \text{ hrs}$