San José State University
Fall 2015
Math-8: College Algebra
Section 03: MW noon–1:15pm
Section 05: MW 4:30–5:45pm

Quiz #3 Solutions

Helpful Formulas

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

1. Use the lowest common denominator method to perform the following addition. For full credit, make sure that you find the LCD, perform the operation, and then simplify the result (if necessary) using prime factorization.

$$\frac{5}{12} + \frac{7}{18} - \frac{11}{24}$$

We start by doing prime factorizations of the denominators:

$12 = 2^2 \cdot 3$
$18 = 2 \cdot 3^2$
$24 = 2^3 \cdot 3$

Next, we make a list of all the primes that occur in all the factorizations: 2 and 3. We then take the highest exponent occurring in any factorization for each prime: 2^3 (from 24) and 3^2 (from 18). Finally, we multiply these together to find the LCD:

$$LCD = 2^3 \cdot 3^2 = 8 \cdot 9 = 72$$

We now adjust our fractions to the new denominator and perform the operation:

$$\begin{aligned} \frac{5 \cdot 6}{12 \cdot 6} + \frac{7 \cdot 4}{18 \cdot 4} - \frac{11 \cdot 3}{24 \cdot 3} &= \frac{30}{72} + \frac{28}{72} - \frac{33}{72} \\ &= \frac{30 + 28 - 33}{72} \\ &= \frac{25}{72} \end{aligned}$$

Finally, we check to see if we can reduce the answer. Again, looking at the prime factorizations:

$25 = 5^2$
$72 = 2^3 \cdot 3^2$

Since there are no common prime factors, the answer is irreducible.

2. For simple interest, interest is paid on the **principal** only. For compound interest, interest is paid on the **principle** and **interest**.

3. Jack puts \$5,000 into a savings account that has a yearly interest rate of 2% and compounds monthly. What is the value of the account after 10 years?

Use the compound interest formula above with:

$P = \$5000$
$r = 2\% = 0.02$
$n = 12$
$t = 10$

Note that for monthly compounding on a yearly interest rate of 2%, $n = 12$ for a monthly interest rate of $\frac{0.02}{12}$.

$$A = \$5000\left(1 + \frac{0.02}{12}\right)^{10 \cdot 12} = \$6106$$

4. Solve for x.

$$\frac{\left[5x\left(x+1\right)^2\right]^2}{x^2(x+1)^5} = -\frac{3}{x}$$

We start by resolving the numerator. For this, we use our rule: $(ab)^n = a^n b^n$. Note that we have 3 factors in the numerator, so we want to make sure and apply the exponent to all three of them. Note that for the last factor we use the rule $(a^m)^n = a^{mn}$:

$$\frac{5^2x^2\left[\left(x+1\right)^2\right]^2}{x^2(x+1)^5} = -\frac{3}{x}$$

$$\frac{5^2x^2\left(x+1\right)^4}{x^2(x+1)^5} = -\frac{3}{x}$$

Now, we group the factors in the numerator and denominator so that we can use our rule $\frac{a^n}{a^m} = a^{n-m}$:

$$25\left[\frac{x^2}{x^2}\right]\left[\frac{(x+1)^4}{(x+1)^5}\right] = -\frac{3}{x}$$

Now, apply the rule:

$$\begin{aligned} 25x^{2-2}(x+1)^{4-5} &= -\frac{3}{x} \\ 25x^{0}(x+1)^{-1} &= -\frac{3}{x} \\ \frac{25(1)}{x+1} &= -\frac{3}{x} \\ \frac{25}{x+1} &= -\frac{3}{x} \end{aligned}$$

Now, cross multiply and solve, being careful with the negative sign:

$$\begin{aligned} 25x &= -3(x+1) \\ 25x &= -3x-3 \\ 28x &= -3 \\ x &= -\frac{3}{28} \end{aligned}$$