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

Homework Week 3 Solutions

Section 0.3

2. $3 \cdot 3^5 = 3^1 \cdot 3^5 = 3^{1+5} = 3^6$

4. $\frac{5^7}{5^5} = 5^{7-5} = 5^2 = 25$

6. $(2^5)^3 = 2^{5 \cdot 3} = 2^{15}$

8. $(-3)^4 = ((-1)3)^4 = (-1)^4 3^4 = (1)3^4 = 3^4 = 81$

10. $(-3 \cdot 4^2)^3 = (-3)^3 (4^2)^3 = -3^3 4^{2 \cdot 3} = -3^3 4^6$

12.

$$\begin{aligned}
\left(\frac{-5}{4}\right)^3 \left(\frac{4}{5}\right)^2 &= \left(\frac{(-5)^3}{4^3}\right)\left(\frac{4^2}{5^2}\right) \\
&= \left(-\frac{5^3}{4^3}\right)\left(\frac{4^2}{5^2}\right) \\
&= -\frac{5^3 4^2}{4^3 5^2} \\
&= -\frac{5^3 4^2}{5^2 4^3} \\
&= -\left(\frac{5^3}{5^2}\right)\left(\frac{4^2}{4^3}\right) \\
&= -(5^{3-2})(4^{2-3}) \\
&= -(5^1)(4^{-1}) \\
&= -\frac{5}{4}
\end{aligned}$$

14. $(-2)^0 = 1$

16. $(-2w)^5 = (-2)^5 w^5 = -32w^5$

18. $5x^4(x^2) = 5(x^4 x^2) = 5x^{4+2} = 5x^6$

20. $2(4x^4)^3 = 2(4^3)((x^4)^3) = 2(64)(x^{4 \cdot 3}) = 128x^{12}$

22. $(6y^2)(2y^3)^3 = (6y^2)(2^3(y^3)^3) = (6y^2)(8y^{3 \cdot 3}) = (6y^2)(8y^9) = (6 \cdot 8)y^{2+9} = 48y^{11}$

24. $\frac{10x^9}{4x^6} = \frac{2 \cdot 5x^9}{2^2 x^6} = \frac{5x^3}{2} = \frac{5}{2}x^3$

26. $\left(\frac{5}{z}\right)^2\left(\frac{2}{z}\right)^3 = \left(\frac{5^2}{z^2}\right)\left(\frac{2^3}{z^3}\right) = \frac{5^2 2^3}{z^2 z^3} = \frac{25\cdot 8}{z^{2+3}} = \frac{200}{z^5}$

28. $\frac{5z^5}{z^7} = \frac{5}{z^2}$

30. $\frac{x^n \cdot x^{2n}}{x^{3n}} = \frac{x^{n+2n}}{x^{3n}} = \frac{x^{3n}}{x^{3n}} = x^{3n-3n} = x^0 = 1$

32. $2^m \cdot 2^{3m} = 2^{m+3m} = 2^{4m} = (2^4)^m = 16^m$

34. $\frac{24(x-2)^5}{8(x-2)^4} = \frac{8\cdot 3(x-2)^5}{8(x-2)^4} = 3(x-2)$

36. $(x+5)^0 = 1 \qquad (x \neq -5)$

38. $6 \cdot 2^{-3} \cdot 3^{-1} = \frac{6}{2^3 \cdot 3} = \frac{2\cdot 3}{2^3 \cdot 3} = \left(\frac{2}{2^3}\right)\left(\frac{3}{3}\right) = \frac{1}{2^2} \cdot 1 = \frac{1}{4}$

40. $\left(\frac{2}{3}\right)^{-3} = \left(\frac{3}{2}\right)^3 = \frac{3^3}{2^3} = \frac{27}{8}$

42. $4^{-1} - 2^{-2} = \frac{1}{4} - \frac{1}{2^2} = \frac{1}{4} - \frac{1}{4} = 0$

44. $-7x^{-1} = -\frac{7}{x}$

46. $\frac{10x^4 y^{-4}}{5x^2 y^{-2}} = \left(\frac{10}{5}\right)\left(\frac{x^4}{x^2}\right)\left(\frac{y^{-4}}{y^{-2}}\right) = \left(\frac{5\cdot 2}{5}\right) x^2 y^{-2} = (2)\, x^2 \left(\frac{1}{y^2}\right) = \frac{2x^2}{y^2}$

48. $\left(\frac{y}{5}\right)^{-2} = \left(\frac{5}{y}\right)^2 = \frac{5^2}{y^2} = \frac{25}{y}$

50. $\left(\frac{2z^2}{y}\right)^{-2} = \left(\frac{y}{2z^2}\right)^2 = \frac{y^2}{(2z^2)^2} = \frac{y^2}{2^2(z^2)^2} = \frac{y^2}{4z^4}$

71. $P = \$10,000$, $r = 3.95\%/yr = 0.0395/yr$, $n = 12yr$

A quick note about units. Something like "$12yr$" means 12 years and something like "$0.0395/yr$" means 0.0395 per year, also sometimes written $0.0395yr^{-1}$. So note that as long as we keep the time units consistent, the time units will "cancel", leaving only the dollar units. This is often called unit analysis.

a. $n = 365/yr$

$A = \$10,000\left(1 + \frac{0.0375/yr}{365/yr}\right)^{12yr\cdot 365/yr} = \$15,682.76$

b. $n = 52/yr$

$A = \$10,000\left(1 + \frac{0.0375/yr}{52/yr}\right)^{12yr\cdot 52/yr} = \$15,680.58$

c. $n = 12/yr$

$A = \$10,000\left(1 + \frac{0.0375/yr}{12/yr}\right)^{12yr\cdot 12/yr} = \$15,672.12$

d. $n = 4/yr$

$A = \$10,000\left(1+\frac{0.0375/yr}{4/yr}\right)^{12yr\cdot 4/yr} = \$15650.28$

Note that the final amount gets smaller as the number of times the interest compounds in one year decreases.

84. $A = \$1,000,000$, $r = 4.5\%/yr = 0.045/yr$, $t = 21yr$, $n = 4/yr$

$P = \frac{\$1{,}000{,}000}{\left(1+\frac{0.045/yr}{4/yr}\right)^{21yr\cdot 4/yr}} = \$390,735.70$