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 2 Solutions

Section 0.2

6. $3x^4 + 2x^3 + x^2 - 1$ has 4 terms:

term	coefficient	variable
$3x^4$	3	x
$2x^3$	2	x
x^2	1	x
1	-1	none

Note that the coefficient of x^2 is in fact 1. Also note that the constant term is -1, not just 1 (remember, adding the negative!). Also also note that even though there is no variable with the term -1, when we talk about polynomials, we consider the constant term to be associated with x^0.

10.

$$-5(-2-6) = -5(-8) = 40$$

or to demonstrate proper use of the distributive law:

$$-5(-2-6) = -5[(-2)+(-6)] = -5(-2) + -5(-6) = 10 + 30 = 40$$

14. Evaluate: $-x^3 + 2x - 1$

a. At $x = 0$:

$$-(0)^3 + 2(0) - 1 = 0 + 0 - 1 = -1$$

b. At $x = 2$:

$$-(2)^3 + 2(2) - 1 = -8 + 4 - 1 = -5$$

22. Evaluate: $\frac{4z-2y}{20x}$ at $x = 3$, $y = -2$, and $z = 4$.

$$\frac{4(4) - 2(-2)}{20(3)} = \frac{16+4}{60} = \frac{20}{60} = \frac{1}{3}$$

23.	$3 + 4 = 4 + 3$	A1	Commutative Addition
24.	$x + 9 = 9 + x$	A1	Commutative Addition
25.	$-15 + 15 = 0$	A4	Additive Inverse
26.	$(x + 2) - (x + 2)$	A4	Additive inverse
27.	$2(x + 3) = 2x + 6$	LD	Left Distributive
28.	$(5 + 9)6 = 5(6) + 9(6)$	RD	Right Distribution
29.	$2(\frac{1}{2} = 1$	M4	Multiplicative Inverse
30.	$\frac{1}{h+6}(h + 6) = 1$	M4	Multiplicative Inverse
31.	$h + 0 = h$	A3	Additive Identity
32.	$(z - 2) + 0 = z - 2$	A3	Additive Identity
33.	$57 \cdot 1 = 57$	M3	Multiplicative Identity
34.	$1 \cdot (1 + x) = 1 + x$	M3	Multiplicative Identity
35.	$6 + (7 + 8) = (6 + 7) + 8$	A2	Associate Addition
36.	$x + (y + 10) = (x + y) + 10$	A2	Associate Addition

37.

$$\begin{array}{rll} x(3y) = (x \cdot 3)y & \text{M2} & \text{Associate Multiplication} \\ = (3x)y & \text{M1} & \text{Commutative Multiplication} \end{array}$$

38.

$$\begin{array}{rll} \frac{1}{7}(7 \cdot 12) = (\frac{1}{7} \cdot 7)12 & \text{M2} & \text{Associate Multiplication} \\ = 1 \cdot 12 & \text{M4} & \text{Multiplicative Inverse} \\ = 12 & \text{M3} & \text{Multiplicative Identity} \end{array}$$

42. $150 = 5 \cdot 30 = 5 \cdot 5 \cdot 6 = 5 \cdot 5 \cdot 2 \cdot 3 = 2 \cdot 3 \cdot 5^2$

52.

$$\begin{aligned} \frac{10}{11} + \frac{6}{33} - \frac{13}{66} &= \frac{10 \cdot 6}{11 \cdot 6} + \frac{6 \cdot 2}{33 \cdot 2} - \frac{13}{66} \\ &= \frac{60}{66} + \frac{12}{66} - \frac{13}{66} \\ &= \frac{60 + 12 - 13}{66} \\ &= \frac{59}{66} \end{aligned}$$

54.

$$\begin{aligned} -\frac{2}{3} \cdot \frac{5}{8} \cdot \frac{3}{4} &= -\frac{2 \cdot 5 \cdot 3}{3 \cdot 8 \cdot 4} \\ &= -\frac{3 \cdot 2 \cdot 5}{3 \cdot 4 \cdot 8} \\ &= -\frac{5}{2 \cdot 8} \\ &= -\frac{5}{16} \end{aligned}$$

70.

Total people in study = 12857
Percent with risk = 39.5%
People at risk = $12857 \cdot 0.395 = 5079$
Note that the answer should be a whole number of people, and in this case we needed to round up.

Section 1.1

2. $3(x + 2) = 3x + 6$ is an identity; it is a statement of the left distributive rule for all real numbers x.

4. $3(x + 2) = 2x + 4$ is conditional (one solution):

$$\begin{aligned} 3(x + 2) &= 2x + 4 \\ 3x + 6 &= 2x + 4 \\ x &= -2 \end{aligned}$$

12. $3 + \frac{1}{x+2} = 4$

a. $x = -1$

$$\begin{aligned} 3 + \frac{1}{(-1)+2} &\stackrel{?}{=} 4 \\ 3 + \frac{1}{1} &\stackrel{?}{=} 4 \\ 3 + 1 &\stackrel{?}{=} 4 \\ 4 &= 4 \end{aligned}$$

YES!

b. $x = -2$

$$\begin{aligned} 3 + \frac{1}{(-2)+2} &\stackrel{?}{=} 4 \\ 3 + \frac{1}{0} &\stackrel{?}{=} 4 \\ \textit{undefined} &\neq 4 \end{aligned}$$

NO!

c. $x = 0$

$$\begin{aligned} 3 + \frac{1}{0+2} &\stackrel{?}{=} 4 \\ 3 + \frac{1}{2} &\stackrel{?}{=} 4 \\ \frac{7}{2} &\neq 4 \end{aligned}$$

NO!

d. $x = 5$

$$\begin{aligned} 3 + \frac{1}{5+2} &\stackrel{?}{=} 4 \\ 3 + \frac{1}{7} &\stackrel{?}{=} 4 \\ \frac{22}{7} &\neq 4 \end{aligned}$$

NO!

14. $(3x + 5)(2x - 7) = 0$

Remember the last property of 0 on page 14: if you multiple two numbers and get 0 then at least one of them has to be 0. And also remember that $3x + 5$ and $2x - 7$ are both *just numbers*!.

a. $x = -\frac{5}{3}$

$3(-\frac{5}{3}) + 5 = -5 + 5 = 0$
YES!

b. $x = -\frac{2}{7}$

$3(-\frac{2}{7}) + 5 = -\frac{6}{7} + 5 = \frac{29}{7} \neq 0$
$2(-\frac{2}{7}) - 7 = -\frac{4}{7} - 7 = -\frac{53}{7} \neq 0$
NO!

c. $x = \frac{2}{3}$

$3(\frac{2}{3}) + 5 = \frac{6}{3} + 5 = 2 + 5 = 7 \neq 0$
$2(\frac{2}{3}) - 7 = \frac{4}{3} - 7 = -\frac{17}{3} \neq 0$
NO!

d. $x = \frac{3}{2}$

$3(\frac{3}{2}) + 5 = \frac{9}{2} + 5 = \frac{19}{2} \neq 0$
$2(\frac{3}{2}) - 7 = 3 - 7 = -4 \neq 0$
NO!

Note that in the following problems I am very careful that each syntactic step employs at most one of our 10 rules (with possible substitution). You don't need to generally be this careful (unless I ask you to in a problem to test your knowledge of the steps); however, you really need to watch for pitfalls with subtraction and division.

18.

$$\begin{aligned} 9 - x &= 13 \\ (9 + (-x)) &= 13 \\ (9 + (-x)) + x &= 13 + x \\ 9 + ((-x) + x) &= 13 + x \\ 9 + 0 &= 13 + x \\ 9 &= 13 + x \\ 9 &= x + 13 \\ 9 + (-13) &= (x + 13) + (-13) \\ -4 &= x + (13 + (-13)) \\ -4 &= x + 0 \\ -4 &= x \\ x &= -4 \end{aligned}$$

20.

$$\begin{aligned} 7x + 2 &= 16 \\ (7x + 2) + (-2) &= 16 + (-2) \\ 7x + (2 + (-2)) &= 14 \\ 7x + 0 &= 14 \end{aligned}$$

$$\begin{aligned} 7x &= 14 \\ \frac{1}{7}(7x) &= \frac{1}{7}(14) \\ (\frac{1}{7}(7))x &= 2 \\ 1x &= 2 \\ x &= 2 \end{aligned}$$

22.

$$\begin{aligned} 7x+3 &= 3x-13 \\ 7x+3 &= 3x+(-13) \\ (-3x)+(7x+3) &= (-3x)+(3x+(-13)) \\ (-3x+7x)+3 &= ((-3x)+3x)+(-13) \\ ((-3+7)x)+3 &= 0+(-13) \\ 4x+3 &= -13 \\ (4x+3)+(-3) &= -13+(-3) \\ 4x+(3+(-3)) &= -16 \\ 4x+0 &= -16 \\ 4x &= -16 \\ \frac{1}{4}(4x) &= \frac{1}{4}(-16) \\ (\frac{1}{4}(4))x &= -4 \\ 1x &= -4 \\ x &= -4 \end{aligned}$$

28.

$$\begin{aligned} 2(13t-15)+3(t-19) &= 0 \\ (2(13t)+2(-15))+(3t+3(-19)) &= 0 \\ ((2\cdot 13)t+(-30))+(3t+(-57)) &= 0 \\ (26t+(-30))+(3t+(-57)) &= 0 \\ (26t+(-30))+(-57+3t) &= 0 \\ 26t+((-30)+(-57+3t)) &= 0 \\ 26t+(((-30)+(-57))+3t) &= 0 \\ 26t+(-87+3t) &= 0 \\ 26t+(3t+(-87)) &= 0 \\ (26t+3t)+(-87) &= 0 \\ ((26t+3t)+(-87))+87 &= 0+87 \\ (26t+3t)+((-87)+87) &= 87 \\ (26t+3t)+0 &= 87 \\ 26t+3t &= 87 \\ (26+3)t &= 87 \\ 29t &= 87 \end{aligned}$$

$$\begin{aligned}
\frac{1}{29}(29x) &= \frac{1}{29}(87) \\
(\frac{1}{29}(29))x &= 3 \\
1x &= 3 \\
x &= 3
\end{aligned}$$

30.

$$\begin{aligned}
3(2x-(x+7)) &= 5(x-3) \\
3(2x+(-x+(-7)) &= 5x+5(-3) \\
3((2x+(-x))+(-7) &= 5x+(-15) \\
3((2+(-1)x+(-7)) &= 5x+(-15) \\
3(x+(-7)) &= 5x+(-15) \\
3x+3(-7) &= 5x+(-15) \\
3x+(-21) &= 5x+(-15) \\
(-3x)+(3x+(-21)) &= (-3x)+(5x+(-15)) \\
(-3x+3x)+(-21) &= ((-3x)+5x)+(-15) \\
0+(-21) &= (-3+5)x+(-15) \\
-21 &= 2x+(-15) \\
-21+15 &= (2x+(-15))+15 \\
-6 &= 2x+(-15+15) \\
-6 &= 2x+0 \\
-6 &= 2x \\
\frac{1}{2}(-6) &= \frac{1}{2}(2x) \\
-3 &= (\frac{1}{2}(2))x \\
-3 &= 1x \\
-3 &= x \\
x &= -3
\end{aligned}$$

34.

$$\begin{aligned}
\frac{x}{5}-\frac{x}{2} &= 3 \\
\frac{x\cdot 2}{5\cdot 2}-\frac{x\cdot 5}{2\cdot 5} &= 3 \\
\frac{2x}{10}-\frac{5x}{10} &= 3 \\
\frac{2x+(-5x)}{10} &= 3 \\
\frac{(2+(-5))x}{10} &= 3 \\
\frac{-3x}{10} &= 3 \\
\frac{1}{10}(-3x) &= 3
\end{aligned}$$

$$\begin{aligned}
10(\frac{1}{10}(-3x)) &= 10(3) \\
(10(\frac{1}{10}))(-3x) &= 30 \\
1(-3x) &= 30 \\
-3x &= 30 \\
-\frac{1}{3}(-3x) &= -\frac{1}{3}(30) \\
(-\frac{1}{3}(-3))x &= -10 \\
1x &= -10 \\
x &= -10
\end{aligned}$$

36.

$$\begin{aligned}
\frac{3x}{2} + \frac{1}{4}(x-2) &= 10 \\
4(\frac{3x}{2} + \frac{1}{4}(x-2)) &= 4(10) \\
4(\frac{3x}{2}) + 4(\frac{1}{4}(x-2)) &= 40 \\
4(\frac{1}{2}(3x)) + (4(\frac{1}{4}))(x-2) &= 40 \\
(4(\frac{1}{2}))(3x) + (1)(x-2) &= 40 \\
(2)(3x) + (x-2) &= 40 \\
(2 \cdot 3)x + (x-2) &= 40 \\
6x + (x + (-2)) &= 40 \\
(6x + x) + (-2) &= 40 \\
(6+1)x + (-2) &= 40 \\
7x + (-2) &= 40 \\
(7x + (-2)) + 2 &= 40 + 2 \\
7x + ((-2) + 2) &= 42 \\
7x + 0 &= 42 \\
7x &= 42 \\
\frac{1}{7}(7x) &= \frac{1}{7}(42) \\
(\frac{1}{7}(7))x &= 6 \\
1x &= 6 \\
x &= 6
\end{aligned}$$

38.

$$\begin{aligned}
\frac{17+y}{y} + \frac{32+y}{y} &= 100 \\
y(\frac{17+y}{y} + \frac{32+y}{y}) &= y \cdot 100
\end{aligned}$$

$$
\begin{aligned}
y(\frac{17+y}{y}) + y(\frac{32+y}{y}) &= 100y \\
y(\frac{1}{y}(y+17)) + y(\frac{1}{y}(32+y)) &= 100y \\
(y(\frac{1}{y}))(y+17) + (y(\frac{1}{y}))(32+y) &= 100y \\
(1)(y+17) + (1)(32+y) &= 100y \\
(y+17) + (32+y) &= 100y \\
y + (17 + (32+y)) &= 100y \\
y + ((17+32)+y) &= 100y \\
y + (49+y) &= 100y \\
y + (y+49) &= 100y \\
(y+y) + 49 &= 100y \\
(1+1)y + 49 &= 100y \\
2y + 49 &= 100y \\
(-2y) + (2y+49) &= (-2y) + 100y \\
((-2y) + 2y) + 49 &= (-2+100)y \\
0 + 49 &= 98y \\
49 + 0 &= 98y \\
49 &= 98y \\
\frac{1}{98}(49) &= \frac{1}{98}(98y) \\
\frac{1}{2} &= (\frac{1}{98}(98))y \\
\frac{1}{2} &= 1y \\
\frac{1}{2} &= y \\
y &= \frac{1}{2}
\end{aligned}
$$

40.

$$
\begin{aligned}
\frac{10x+3}{5x+6} &= \frac{1}{2} \\
2(10x+3) &= 1(5x+6) \\
2(10x) + 2(3) &= 5x+6 \\
(2 \cdot 10)x + 6 &= 5x+6 \\
20x + 6 &= 5x+6 \\
(20x+6) + (-6) &= (5x+6) + (-6) \\
20x + (6 + (-6)) &= 5x + (6 + (-6)) \\
20x + 0 &= 5x + 0 \\
20x &= 5x \\
20x + (-5x) &= 5x + (-5x) \\
(20 + (-5))x &= 0
\end{aligned}
$$

$$\begin{aligned} 15x &= 0 \\ \frac{1}{15}(15x) &= \frac{1}{15}(0) \\ (\frac{1}{15}(15))x &= 0 \\ 1x &= 0 \\ x &= 0 \end{aligned}$$

50.

$$\begin{aligned} 0.60x + 0.40(100 - x) &= 50 \\ 0.60x + (0.40(100) + 0.40(-x)) &= 50 \\ 0.60x + (40 + (-0.40x)) &= 50 \\ 0.60x + ((-0.40x) + 40) &= 50 \\ (0.60x + (-0.40x)) + 40 &= 50 \\ 0.20x + 40 &= 50 \\ (0.20x + 40) + (-40) &= 50 + (-40) \\ 0.20x + (40 + (-40)) &= 10 \\ 0.20x + 0 &= 10 \\ 0.20x &= 10 \\ \frac{1}{0.20}(0.20x) &= \frac{1}{0.20}(10) \\ (\frac{1}{0.20}(0.20))x &= 50 \\ 1x &= 50 \\ x &= 50 \end{aligned}$$

76. First, we let $S = 18$ (for \$18 billion) and solve:

$$\begin{aligned} 18 &= 2.903t - 1.98 \\ 18 + 1.98 &= (2.903t + (-1.98)) + 1.98 \\ 19.98 &= 2.903t + ((-1.98) + 1.98) \\ 19.98 &= 2.903t + 0 \\ 19.98 &= 2.903t \\ \frac{19.98}{2.903} &= \frac{2.903t}{2.903} \\ 6.883 &= t \\ t &= 6.883 \end{aligned}$$

So somewhere near the end of "year 6", which is 2006.

78. First, we solve the male femur length equation to determine the man's height:

$$\begin{aligned} 21 &= 0.449x - 12.15 \\ 21 + 12.15 &= (0.449x + (-12.15)) + 12.15 \end{aligned}$$

$$
\begin{aligned}
33.15 &= 0.449x + ((-12.15) + 12.15) \\
33.15 &= 0.449x + 0 \\
33.15 &= 0.449x \\
\frac{33.15}{0.449} &= \frac{0.449x}{0.449} \\
73.83 &= 1x \\
x &\approx 74 \text{ inches} \\
x &\approx 6 \text{ feet } 2 \text{ inches}
\end{aligned}
$$

Thus, it is possible that the femur belongs to the missing man.