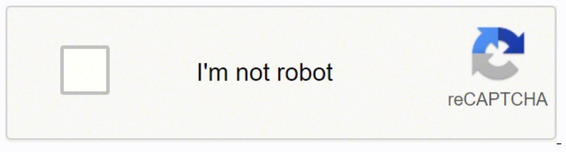

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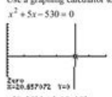
41. $P = 2x^2 - 12x - 32$
The company makes a profit when
$2x^2 - 12x - 32 > 0$.
Solve the corresponding equation.
$2x^2 - 12x - 32 = 0$
$2(x^2 - 6x - 16) = 0$
$(x+2)(x-8) = 0 \Rightarrow x = -2$ or $x = 8$
The test regions are $A(-\infty, -2)$, $B(-2, 8)$, and $C(8, \infty)$. Region A makes no sense in this context, so we ignore this. Test a number from regions B and C in the original inequality.
For region B, let $x = 0$.
$2(0)^2 - 12(0) - 32 = -32 < 0$
For region C, let $x = 10$.
$2(10)^2 - 12(10) - 32 = 48 > 0$
The numbers in region C satisfy the inequality. The company makes a profit when the amount spent on advertising in hundreds of thousands of dollars is in the interval $(8, \infty)$.

42. $P = 4t^2 - 30t + 14$
We want to find the values of t for which $P > 0$, that is, we must solve the inequality
$4t^2 - 30t + 14 > 0$.
Solve the corresponding equation.
$4t^2 - 30t + 14 = 0$
$2(2t^2 - 15t + 7) = 0$
$(2t-1)(t-7) = 0 \Rightarrow t = \frac{1}{2}$ or $t = 7$
We only consider positive values of t because t represents time (in months). The test regions are $A(0, \frac{1}{2})$, $B(\frac{1}{2}, 7)$, and $C(7, \infty)$.
In region A, let $t = \frac{1}{4}$.:
$4\left(\frac{1}{4}\right)^2 - 30\left(\frac{1}{4}\right) + 14 = \frac{27}{4} > 0.$
In region B, let $t = 3$:
$4(3)^2 - 30(3) + 14 = -40 < 0.$
In region C, let $t = 10$:
$4(10)^2 - 30(10) + 14 = 114 > 0.$.
The solution is $(0, \frac{1}{2})$ or $(7, \infty)$.
The investor makes a profit between $t = 0$ and $t = \frac{1}{2}$ month and after 7 months.

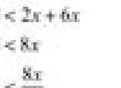
43. $P = x^2 + 300x - 18{,}000$
The complex makes a profit when
$x^2 + 300x - 18{,}000 > 0$.
Solve the corresponding equation.
$0 = x^2 + 300x - 18{,}000$
$x = \frac{-300 \pm \sqrt{(300)^2 - 4(1)(-18{,}000)}}{2(1)}$
$x = 51.25$ or $x = -351.25$
We only consider positive values of x because x represents the number of apartments rented. The test regions are $A(0, 52)$ and $B(52, 200)$.
In region A, let $x = 1$:
$(1)^2 + 300(1) - 18{,}000 = -17{,}699 < 0$.
In region B, let $x = 100$:
$(100)^2 + 300(100) - 18{,}000 = 22{,}000 > 0$.
The complex makes a profit when the number of units rented is between 52 and 200, inclusive, or when x is in the interval [52, 200].

44. $x^2 + 5x - 530 > 0$
Use a graphing calculator to solve
$x^2 + 5x - 530 = 0$



[0, 30] by [–10, 10]
The graph lies above the x-axis for $x > 20.657$. Thus, the salesman needs to make 21 pitches or more to earn a profit.

45. $.79x^2 + 5.4x + 178 > 300$
Use a graphing calculator to solve
$.79x^2 + 5.4x + 178 = 300 \Rightarrow$
$.79x^2 + 5.4x - 122 = 0$



[0, 20] by [–50, 50]
The graph lies above the x-axis for $x > 9.47$, which corresponds to the middle of 2009. Thus, there will be more than 300 million subscribers from 2010.

69. a. $x = 0$
$y = -1.8(0) + 384.6 = 384.6$
There were approximately 384.6 thousand or 384,600 employees working in the motion picture and sound industries in 2000.
b. $x = 10$
$y = -1.8(10) + 384.6 = 366.6$
There were approximately 366.6 thousand or 366,600 employees working in the motion picture and sound industries in 2010.
c. $y = 350$
$350 = -1.8x + 384.6$
$-34.6 = -1.8x \Rightarrow x = 19.2$
This corresponds to the year 2019.
There will be approximately 350,000 employees working in the motion picture and sound industries in 2019.

70. a. $x = 10$
$y = -42.1(10) + 16{,}288 = 15{,}867$
There were 15,687 golf facilities in 2010.
b. $y = 15{,}500$
$15{,}500 = -42.1x + 16{,}288$
$-788 = -42.1x \Rightarrow x = 18.7$
This corresponds to the year 2018.
There will be 15,500 golf facilities in 2018.

71. a. The given data is represented by the points (5, 35.1) and (11, 29.7).
b. Find the slope.
$m = \frac{29.7 - 35.1}{11 - 5} = \frac{-5.4}{6} = -0.9$
$y - y_1 = m(x - x_1)$
$y - 29.7 = -0.9(x - 11)$
$y - 29.7 = -0.9x + 9.9$
$y = -0.9x + 39.6$
c. The year 2009 corresponds to $x = 9$.
$y = -0.9(9) + 39.6 = 31.5$
Total sales associated with lawn care were about $31.5 billion in 2009.
d. $y = 25$
$25 = -0.9x + 39.6$
$-14.6 = -0.9x \Rightarrow x = 16.2$
This corresponds to the year 2016. Total sales associated with lawn care will reach $25 billion in 2016.

72. a. $(x_1, y_1) = (0, 16.3)$ and $(x_2, y_2) = (10, 14.9)$
Find the slope.
$m = \frac{14.9 - 16.3}{10 - 0} = \frac{-1.4}{10} = -.14$
Use the slope-intercept form with (0, 16.3).
$y = -.14x + 16.3$
b. Let $x = 15$.
$y = -.14(15) + 16.3 = 14.2$
According to the model, there will be 14.2 million union workers in 2015.

73. a. $(x_1, y_1) = (0, .4)$ and $(x_2, y_2) = (10, .75)$
Find the slope.
$m = \frac{.75 - .4}{10 - 0} = \frac{.35}{10} = 0.035$
The y-intercept is .4, so the equation of the line is $y = 0.035x + 0.4$.
b. The year 2014 corresponds to
$x = 2014 - 2002 = 14$.
$y = 0.035(2) + 0.4 = 0.82$
In 2014, the price for chicken legs will be about $0.82 per pound.

74. a. $(x_1, y_1) = (0, .6)$ and $(x_2, y_2) = (10, 1.25)$
Find the slope.
$m = \frac{1.25 - .6}{10 - 0} = \frac{.65}{10} = 0.065$
The y-intercept is .6, so the equation of the line is $y = 0.065x + 0.6$.
b. The year 2010 corresponds to
$x = 2010 - 2002 = 8$.
$y = 0.065(8) + 0.6 = 1.12$
In 2010, the price for chicken thighs was about $1.12 per pound.

75. a. $(x_1, y_1) = (0, 36845)$ and
$(x_2, y_2) = (10, 27200)$
Find the slope.
$m = \frac{27{,}200 - 36{,}845}{10 - 0} = -964.5$
The y-intercept is 36,845, so the equation is $y = -964.5x + 36{,}845$.

d. The correlation coefficient is .988. This indicates that the line is a good fit.

39.
$$-6x + 3 < 2x$$
$$-6x + 6x + 3 < 2x + 6x$$
$$3 < 8x$$
$$\frac{3}{8} < \frac{8x}{8}$$
$$\frac{3}{8} < x \text{ or } x > \frac{3}{8}$$
The solution is $\left(\frac{3}{8}, \infty\right)$.

40.
$$12z \geq 5z - 7$$
$$12z - 5z \geq 5z - 5z - 7$$
$$7z \geq -7$$
$$\frac{7z}{7} \geq \frac{-7}{7}$$
$$z \geq -1$$
The solution is $[-1, \infty)$.

41.
$$2(3 - 2m) \geq 8m + 3$$
$$6 - 4m \geq 8m + 3$$
$$6 - 4m - 8m \geq 8m - 8m + 3$$
$$6 - 12m \geq 3$$
$$6 - 6 - 12m \geq 3 - 6$$
$$-12m \geq -3$$
$$\frac{-12m}{-12} \leq \frac{-3}{-12}$$
$$m \leq \frac{1}{4}$$
The solution is $\left(-\infty, \frac{1}{4}\right]$.

42.
$$6p - 5 > -(2p + 3)$$
$$6p - 5 > -2p - 3$$
$$8p - 5 > -3$$
$$8p > 2$$
$$\frac{8p}{8} > \frac{2}{8}$$
$$p > \frac{1}{4}$$
The solution is $\left(\frac{1}{4}, \infty\right)$.

43.
$$-3 \leq 4x - 1 \leq 7$$
$$-2 \leq 4x \leq 8$$
$$-\frac{1}{2} \leq x \leq 2$$
The solution is $\left[-\frac{1}{2}, 2\right]$.

44.
$$0 \leq 3 - 2a \leq 15$$
$$0 - 3 \leq 3 - 3 - 2a \leq 15 - 3$$
$$-3 \leq -2a \leq 12$$
$$\frac{-3}{-2} \geq \frac{-2a}{-2} \geq \frac{12}{-2}$$
$$\frac{3}{2} \geq a \geq -6$$
The solution is $\left[-6, \frac{3}{2}\right]$.

45. $|b| \leq 8 \Rightarrow -8 \leq b \leq 8$
The solution is $[-8, 8]$.

46. $|a| > 7 \Rightarrow a < -7$ or $a > 7$
The solution is $(-\infty, -7)$ or $(7, \infty)$.

47. $|2x - 7| \geq 3$
$2x - 7 \leq -3$ or $2x - 7 \geq 3$
$2x \leq 4$ or $2x \geq 10$
$x \leq 2$ or $x \geq 5$
The solution is $(-\infty, 2]$ or $[5, \infty)$.

48.
$$|4m + 9| \leq 16$$
$$-16 \leq 4m + 9 \leq 16$$
$$-25 \leq 4m \leq 7$$
$$-\frac{25}{4} \leq m \leq \frac{7}{4}$$
The solution is $\left[-\frac{25}{4}, \frac{7}{4}\right]$.

49.
$$|5k + 2| - 3 \leq 4$$
$$|5k + 2| \leq 7$$
$$-7 \leq 5k + 2 \leq 7$$
$$-9 \leq 5k \leq 5$$
$$-\frac{9}{5} \leq k \leq 1$$
The solution is $\left[-\frac{9}{5}, 1\right]$.

15. a. Using a graphing calculator, the regression-line model is $y = 5.90x + 146.59$.

b. The year 2015 corresponds to $x = 15$. Using the regression-line model generated by a graphing calculator, we have
$y = 5.90(15) + 146.59 = 235.09$, or about \$235 billion in sales.

16. a. Using a graphing calculator, we find that the linear model is $y = -7.72x + 407.94$

b. The year 2015 corresponds to $x = 35$. Using the regression-line model generated by a graphing calculator, we have
$y = -7.72(35) + 407.94 = 137.74$, or about 137 deaths per 100,000 people from heart disease.

17. a. Using a graphing calculator, the regression-line model is
$y = -3.96x + 73.98$.

b. The year 2016 corresponds to $x = 16$. Using the regression-line model generated by a graphing calculator, we have
$y = -3.96(16) + 73.98 = 10.62$, or about \$10.62 billion in revenue.

18. a. Using a graphing calculator, the regression-line model is
$y = 14.9x + 2822$.

b. Using the regression-line model:
Let $x = 150$ feet squared.
$y = 14.9(150) + 2822 = 5057$
Let $x = 280$ feet squared.
$y = 14.9(280) + 2822 = 6994$
Let $x = 420$ feet squared.
$y = 14.9(420) + 2822 = 9080$
The predicted values are very close to the actual data values.

c. Using the regression-line model:
Let $x = 235$ feet squared.
$y = 14.9(235) + 2822 = 6323.5$
Adam should choose the closest value above the requirement. therefore, Adam should choose the 6500 BTU air conditioner.

19. a. Using a graphing calculator, the regression line model for estimated operating revenue (in billions of dollars) from internet publishing and broadcasting is given by $y = 2.37x - 2.02$.

b. Let $x = 12$ (2012).
$y = 2.37(12) - 2.02 = 26.42$ billion
Let $x = 14$ (2014).
$y = 2.37(14) - 2.02 = 31.16$ billion
The operating revenue was about \$26.42 billion in 2012 and will be about \$31.16 billion in 2014.

20. a. Using a graphing calculator, the regression-line model is
$y = -0.62x + 68.28$.

b. $y = -0.62(9) + 68.28 = 62.7$. There were about 62.7 million subscribers in 2009.

c. Let $y = 55$.
$55 = -0.62x + 68.28$
$-13.28 = -0.62x$
$x = 21.4$
There will be 55 million subscribers in the year 2021.

d. Using a graphing calculator, the coefficient of correlation is about $-.915$.

21. a. Using a graphing calculator, the regression-line model is
$y = -2.318x + 55.88$.

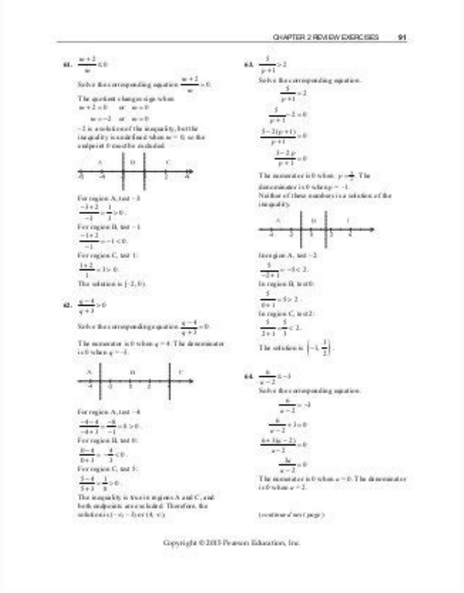
b. $y = -2.318(6) + 55.88 = 41.972$. There were about 41,972 traffic fatalities in 2006.

c. Let $y = 28$.
$28 = -2.318x + 55.88$
$-27.88 = -2.318x$
$x = 12.03$
There were 28,000 traffic fatalities in the year 2012.

d. Using a graphing calculator, the coefficient of correlation is about $-.972$.

22. a. Using a graphing calculator, the regression-line model for men is
$y = .215x + 52.6$.

b. Using a graphing calculator, the regression-line model for women is
$y = .144x + 65.4$.



61. $\frac{w+2}{w} \le 0$

Solve the corresponding equation $\frac{w+2}{w} = 0$.

The quotient changes sign when
$w + 2 = 0$ or $w = 0$
$w = -2$ or $w = 0$

-2 is a solution of the inequality, but the inequality is undefined when $w = 0$, so the endpoint 0 must be excluded.

For region A, test -3:
$\frac{-3+2}{-3} = \frac{-1}{-3} > 0$.

For region C, test 1:
$\frac{1+2}{1} = 3 > 0$.

The solution is $[-2, 0)$.

62. $\frac{q-4}{q+2} > 0$

Solve the corresponding equation $\frac{q-4}{q+2} = 0$.

The numerator is 0 when $q = 4$. The denominator is 0 when $q = -2$.

For region A, test -4:
$\frac{-4-4}{-4+2} = \frac{-8}{-2} = 4 > 0$.

For region B, test 0:
$\frac{0-4}{0+2} = -\frac{4}{2} < 0$.

For region C, test 5:
$\frac{5-4}{5+2} = \frac{1}{7} > 0$.

The inequality is true in regions A and C, and both endpoints are excluded. Therefore, the solution is $(-\infty, -2) \cup (4, \infty)$.

63. $\frac{1}{p+1} > 2$

Solve the corresponding equation.
$\frac{1}{p+1} = 2$
$\frac{1}{p+1} - 2 = 0$
$\frac{1-2(p+1)}{p+1} = 0$
$\frac{1-2p}{p+1} = 0$

The numerator is 0 when $p = \frac{1}{2}$. The denominator is 0 when $p = -1$.
Neither of these numbers is a solution of the inequality.

For region A, test -2:
$\frac{1}{-2+1} = \frac{1}{-1} < 2$.

For region B, test 0:
$\frac{1}{0+1} = \frac{1}{1} > 2$.

For region C, test 2:
$\frac{1}{2+1} = \frac{1}{3} < 2$.

The solution is $\left(-1, \frac{1}{2}\right]$.

64. $\frac{6}{a-2} \le -3$

Solve the corresponding equation.
$\frac{6}{a-2} = -3$
$\frac{6}{a-2} + 3 = 0$
$\frac{6+3(a-2)}{a-2} = 0$
$\frac{3a}{a-2} = 0$

The numerator is 0 when $a = 0$. The denominator is 0 when $a = 2$.

(continued next page)

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