

1. (a) Mrs. Smith earns commission for her sales job. The 1st year she made \$27,843, the second \$38,425, the third, \$34,582, the fourth \$59,243, and the fifth \$41,283. Find the mean, median, and mode. Explain which measure will best predict how much Mrs. Smith will make her 6th year.

Mean: 40,275.20 median: 38,425 mode: N/A
 median is best - 4th year excessively high, affects mean.

(b) Commissions were \$30,000, \$30,000, \$42,000, \$31,000, \$22,000.

mean: 31,000 median: 30,000 mode: 30,000

~~mean~~ median / mode best, don't include high \$42,000

(c) \$100,000, \$101,000, \$107,000, \$99,000, \$98,000.

mean: 101,000 median: 100,000 mode: NONE

2(a) Make a stem-and-leaf plot for the following set of data:

~~342, 411, 313, 382, 356, 359, 347, 382, 310, 349.~~

Make sure to include a key.

Stem	Leaf
31	0 3
34	2 7 9
35	6 9
38	2 2
41	1

31|0 means 310

(b) ~~4.8, 10.6, 5.2, 6.5, 4.1, 5.5, 7.5, 7.1, 7.0, 7.6, 6.9, 5.1, 5.1, 6.2, 4.7, 4.6, 7.2~~

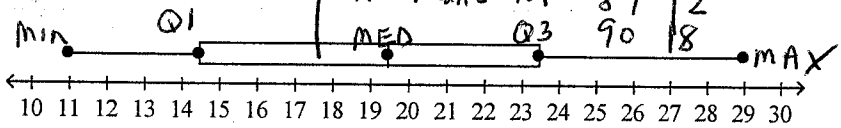
Stem	Leaf
4	1 6 7 8
5	1 1 2 5
6	2 5 9
7	0 1 2 5 6
10	6

4|1 means 4.1

Stem	Leaf
72	4
74	2
75	1 1
80	6
83	1 2 6
85	3 4
86	5
87	2
90	8

(c) ~~85.3, 83.2, 83.6, 86.5, 72.4, 74.2, 90.8, 87.2, 83.1, 85.4, 80.6, 75.1, 75.1~~

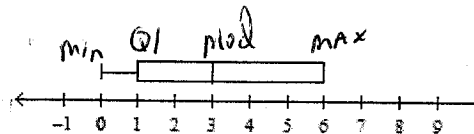
3a. Label the data in each box-and-whiskerplot. Label quartiles, median, extreme values.



(a) What percent of the data fell between 11 and 23.5?

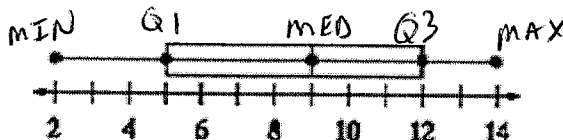
75%

(b) What percent of the data fell between 0 and 3?



50%

(c) What percent of the data fell between 12 and 14?



25%

4. Find the mean and standard deviation.

(a) 5.7, 8.3, 9.1, 6.3, 4.7, 8.2, 6.3, 10.1, 4.3, 5.2, 4.8

$$\bar{x} = 6.64 \quad \sigma = 1.88$$

(b) 9, 5, 2, 3.2, 7.1, 6, 9.1, 8.3, 5.6, 2.4, 3.6, 8.7, 1.5, 8.2, 1.1, 5.6, 9.7, 9.3

$$\bar{x} = 5.86 \quad \sigma = 2.88$$

(c) 100, 105, 108, 60, 177, 186, 162, 122, 175, 155, 168, 135, 142, 173, 116, 101, 188

$$\bar{x} = 139.59 \quad \sigma = 36.21$$

5. (a) Scores on an exam are normally distributed with a mean of 81 and standard deviation of 3. What percent of the scores are greater than 87? If 200 people took the exam, how many students would score between 81 and 87?

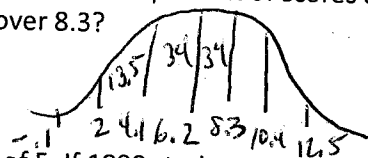


~~Area to the right of 87~~
2.5%

Area between 81 and 87
 $0.475 \times 200 = 95$ students

(b) Mean is 6.2 with standard deviation of 2.1. What percent of scores are between 2.0 and 8.3? between 81 and 87? If 400 people took the test, how many scored over 8.3?

Area between 2.0 and 8.3
 $0.16 \times 400 = 64$ people



Area to the right of 8.3
81.5%

(c) Mean is 28.5 with standard deviation of 5. If 1000 students took the test, how many would score lower than 28.5?

$$0.50 \times 1,000 = 500 \text{ students}$$

6. Simplify the following:

(a) $-4(-5x+3)+6x$

$$20x - 12 + 6x$$

$$26x - 12$$

(b) $2(-3x+7)-5$

$$-6x + 14 - 5$$

$$-6x + 9$$

(c) $6(2x+3y)+5(3x-4y)$

$$12x + 18y + 15x - 20y$$

$$27x - 2y$$

7. Solve each of the following:

(a) $-6y-4=-(2y+6)$

$$-6y - 4 = -2y - 6$$

$$2 = 4y$$

$$y = \frac{1}{2}$$

(b) $2(m-4)+5=9$

$$2m - 8 + 5 = 9$$

$$2m = 12$$

$$m = 6$$

(c) $-(5a-5) = -2(a+5)$

$$-5a + 5 = -2a - 10$$

$$15 = 3a$$

$$a = 5$$

8. Simplify each of the following:

(a) $-3x^3 \cdot 5y^{-2} \cdot 8y^7 \cdot x^{-4}$

$$-120x^{-1}y^5$$

$$\frac{-120y^5}{x}$$

(b) $6x^5 \cdot 3y^{-8} \cdot 5y^{10} \cdot 7x^{-9}$

$$630x^{-4}y^2$$

$$\frac{630y^2}{x^4}$$

(c) $-8x^9y^{-1}6xy^{-6}z^{-2}$

$$-48x^{10}y^{-7}z^{-2}$$

$$\frac{-48x^{10}}{y^7z^2}$$

$$(d) (x^3)^5$$
$$x^{15}$$

$$(e) (m^6)^4$$
$$m^{24}$$

$$(f) (3m^8)^3$$
$$27m^{24}$$

$$(g) (-4a^4b^3)^2(a^3b^5)^3$$
$$(16a^8b^6)(a^9b^{15}) = 16a^{17}b^{21}$$

$$(h) (x^3y^8)^2(-2xy^5)^3$$
$$x^6y^{16} \cdot -8x^3y^{15}$$
$$-8x^9y^{31}$$

$$(i) (-2y^5)^2$$
$$4y^{10}$$

$$(j) \frac{x^{16}}{x^4}$$
$$x^{12}$$

$$(k) \frac{b^{-4}}{b^{-5}}$$
$$b$$

$$(l) \frac{x^3y^{10}}{xy^4}$$
$$x^2y^6$$

$$(m) \frac{m^{-4}n^{-5}}{m^{-7}n^{-4}}$$
$$m^3n^{-1} = \frac{m^3}{n}$$

$$(n) \frac{3x^{-2}y^{-4}}{18x^{-4}y^{-2}}$$
$$\frac{1}{6} x^2 y^{-2}$$
$$\frac{x^2}{6y^2}$$

$$(o) \left(\frac{m^{-2}m^6}{m^{-3}}\right)^{-4}$$
$$\rightarrow (m^7)^{-4}$$
$$m^{-28} \rightarrow \frac{1}{m^{28}}$$

$$(p) \left(\frac{x^5x^{-10}}{x^{-5}}\right)^{-3}$$
$$\left(\frac{x^{-5}}{x^{-5}}\right)^{-3} \rightarrow (1)^{-3} = 1$$

$$(q) 13^{\frac{1}{3}} \cdot 13^{\frac{2}{3}}$$

$$13^{\frac{3}{3}} = 13$$

$$(r) 15^{\frac{2}{5}} \cdot 15^{\frac{4}{5}} \cdot 15^{\frac{4}{5}}$$

$$15^{\frac{10}{5}} = 15^2 = 225$$

9. Simplify by FOILING:

$$(a) (2x-6)(4x+7)$$

$$8x^2 - 10x - 42$$

$$(c) (9x+8)(9x+8)$$

$$81x^2 + 144x + 64$$

$$(e) (3x+7)(3x-7)$$

$$9x^2 - 49$$

$$(b) (5x+1)(2x-3)$$

$$10x^2 - 13x - 3$$

$$(d) (2x-4)^2$$

$$4x^2 - 16x + 16$$

$$(f) (6x+y)(6x-y)$$

$$36x^2 - y^2$$

10. Find the Difference:

$$(a) (-8x + 6x^2 - 9) - (-9x^2 + 5x - 3)$$

$$15x^2 - 13x - 6$$

$$(b) (4x + 15 - 2x^2) - (3x - 10x^2 + 23)$$

$$8x^2 + x - 8$$

11. Find the sum:

$$(a) (9x + 7x^2 - 19) + (12x^3 - 5x + 4)$$

$$12x^3 + 7x^2 + 4x - 15$$

$$(b) (15x^2 + 8y - 6) + (-3y + 10y^4 + 16)$$

$$10y^4 + 15y^2 + 5y + 10$$

12. Divide using synthetic division.

(a) $(4x^3 - 3x^2 + x + 7) \div (x - 2)$

$$\begin{array}{r|rrrr} 2 & 4 & -3 & 1 & 7 \\ & & 8 & 10 & 22 \\ \hline & 4 & 5 & 11 & 29 \end{array}$$

$$4x^2 + 5x + 11 + \frac{29}{x-2}$$

(b) $(2b^3 - 11b^2 + 12b + 9) \div (b - 3)$

$$\begin{array}{r|rrrr} 3 & 2 & -11 & 12 & 9 \\ & & 6 & -15 & -9 \\ \hline & 2 & -5 & -3 & 0 \end{array}$$

$$2x^2 - 5x - 3$$

(c) $(3r^4 - 6r^3 - 2r^2 + r - 6) \div (r + 1)$

$$\begin{array}{r|rrrrr} -1 & 3 & -6 & -2 & 1 & -6 \\ & & -3 & 9 & -7 & 6 \\ \hline & 3 & -9 & 7 & -6 & 0 \end{array}$$

$$3x^3 - 9x^2 + 7x - 6$$

(d) $(2x^3 + 9x^2 - 2x + 7) \div (x + 2)$

$$\begin{array}{r|rrrr} -2 & 2 & 9 & -2 & 7 \\ & & -4 & -10 & 24 \\ \hline & 2 & 5 & -12 & 31 \end{array}$$

$$2x^2 + 5x - 12 + \frac{31}{x+2}$$

13. Factor the following:

(a) $x^2 - 8x + 16$

$$(x - 4)(x - 4)$$

(b) $x^2 - 2x - 15$

$$(x - 5)(x + 3)$$

(c) $x^2 - 6x - 27$

$$(x - 9)(x + 3)$$

(d) $x^2 - 14x + 45$

$$(x - 9)(x - 5)$$

(e) $9x^2 + 15x + 4$

$$(3x + 1)(3x + 4)$$

(f) $6p^2 - 13p - 28$

$$(3p + 4)(2p - 7)$$

(g) $3g^2 + 8g + 4$

$$(3g + 2)(g + 2)$$

(h) $2x^2 + 5x + 3$

$$(2x + 3)(x + 1)$$

(i) $9a^2 - 121b^2$

$$(3a - 11b)(3a + 11b)$$

(j) $36a^2 - 49b^2$

$$(6a - 7b)(6a + 7b)$$

(k) $[4x^3 - 3x^2] + 20x - 15$

$$x^2(4x - 3) + 5(4x - 3)$$

$$(x^2 + 5)(4x - 3)$$

(l) $5h^2 - 10h - h + 2$

$$5h(h - 2) - 1(h - 2)$$

$$(5h - 1)(h - 2)$$

Simplify each radical expression.

14. (a) $\sqrt{\frac{15}{36}} = \frac{\sqrt{15}}{6}$

(b) $\sqrt{\frac{24}{150}} \cdot \sqrt{\frac{4}{25}} = \frac{2}{5}$

15. (a) $\sqrt{49g^8} = 7g^4$

(b) $\sqrt{121x^4y^3} = 11x^2y\sqrt{y}$

16. (a) $\sqrt[3]{27x^{15}y^6} = 3x^5y^2$

(b) $\sqrt[3]{125m^9n^2} = 5m^3\sqrt[3]{n^2}$

Multiply and simplify, if possible.

17. (a) $\sqrt{10} \cdot \sqrt{5} = \sqrt{50} = 5\sqrt{2}$

(b) $\sqrt{8} \cdot \sqrt{20} = \sqrt{160} = \sqrt{16} \cdot \sqrt{10} = 4\sqrt{10}$

Simplify.

30. (a) $\sqrt[3]{192g^{14}f^9} = \sqrt[3]{64} \cdot \sqrt[3]{3} \cdot \sqrt[3]{g^{12}} \cdot \sqrt[3]{g^2} \cdot \sqrt[3]{f^9} = 4g^4f^3\sqrt[3]{3g^2}$

(b) $\sqrt[3]{250m^{10}n^{12}p^{14}} = \sqrt[3]{125} \cdot \sqrt[3]{2} \cdot \sqrt[3]{m^9} \cdot \sqrt[3]{m} \cdot \sqrt[3]{n^{12}} \cdot \sqrt[3]{p^{12}} \cdot \sqrt[3]{p^2} = 5m^4n^4p^4\sqrt[3]{2mp^2}$

Divide and Simplify.

19. (a) $\frac{\sqrt{70x^{16}}}{\sqrt{2x}} \cdot \sqrt{35x^{15}}$

$\sqrt{35} \cdot \sqrt{x^{14}} \cdot \sqrt{x} = x^7\sqrt{35x}$

(b) $\frac{\sqrt{42x^{12}}}{3x^3} = \frac{x^4\sqrt{42}}{3x^3} = \frac{x\sqrt{42}}{3}$

20. (a) The formula $s = 2\sqrt{5\ell}$ estimates the speed s in miles per hour of a car when it leaves skid marks ℓ feet long. On one occasion an accident scene investigation team measured skid marks 90 feet long. How fast was the car traveling? Round your answer to the nearest hundredth.

(b) What if the skid mark was 85 feet long? How fast was the car traveling?

~~$90 \text{ feet} \cdot \frac{1 \text{ mile}}{5280 \text{ ft}} = .017 \text{ mi}$~~

a.) $s = 2\sqrt{5 \cdot 90} = 2\sqrt{450} = 2\sqrt{225 \cdot 2} = 30\sqrt{2} \approx 42.43 \text{ mph}$

b.) $2\sqrt{5 \cdot 85} = 2\sqrt{425} \approx 41.23 \text{ mph}$

21. Simplify.

(a) $\frac{\sqrt{7a^{10}b^9}}{\sqrt{6a^4b^6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{7a^6b^3} \cdot \sqrt{6}}{\sqrt{6}}$

$\frac{\sqrt{42a^6b^3}}{6} = \frac{a^3b\sqrt{42b}}{6}$

(b) $\frac{\sqrt{11a^2b^4}}{\sqrt{10ab^2}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{\sqrt{110a^2b^4}}{10}$

$= \frac{ab^2\sqrt{110}}{10}$

22. Simplify each expression.

$$(a) \frac{\sqrt{2}-\sqrt{7}}{\sqrt{2}+\sqrt{7}} \cdot \frac{\sqrt{2}-\sqrt{7}}{\sqrt{2}-\sqrt{7}} = \frac{2-2\sqrt{14}+7}{2-7}$$

$$\frac{-9+2\sqrt{14}}{+5}$$

$$(b) \frac{5+\sqrt{3}}{4+\sqrt{3}} \cdot \frac{4-\sqrt{3}}{4-\sqrt{3}} = \frac{20-5\sqrt{3}+4\sqrt{3}-3}{16-3}$$

$$\frac{17-\sqrt{3}}{13}$$

23. Multiply. Simplify if necessary

$$(a) (8-\sqrt{3})(9+\sqrt{3})$$

$$72+8\sqrt{3}-9\sqrt{3}-3$$

$$69-\sqrt{3}$$

$$(b) (7+\sqrt{5})(10+\sqrt{5})$$

$$70+7\sqrt{5}+10\sqrt{5}+5$$

$$75+17\sqrt{5}$$

24. Solve each equation:

$$(a) \sqrt{y+1}-5=8$$

$$(\sqrt{y+1})^2 = (13)^2$$

$$y+1=169$$

$$y=168$$

$$(b) \sqrt{x-7}+4=10$$

$$(\sqrt{x-7})^2 = (6)^2$$

$$x-7=36$$

$$x=43$$

$$(c) \sqrt{3x+2}=5$$

$$3x+2=25$$

$$3x=23$$

$$x=\frac{23}{3}$$

$$(d) 4=\sqrt{x+7}$$

$$16=x+7$$

$$x=9$$

$$(e) 10=\sqrt{4x+6}$$

$$100=4x+6$$

$$94=4x$$

$$x=\frac{47}{2}$$

25. Simplify using i

$$(a) \sqrt{-192}$$

$$\sqrt{-1} \sqrt{64} \sqrt{3}$$

$$8i\sqrt{3}$$

$$(b) \sqrt{-144}$$

$$12i$$

$$(c) \sqrt{-50}$$

$$\sqrt{-1} \cdot \sqrt{25} \sqrt{2}$$

$$5i\sqrt{2}$$

Simplify each expression.

$$26. (a) (6-7i)-(4+3i)$$

$$2-4i$$

$$(b) (8+6i)-(-2-3i)$$

$$10+9i$$

Simplify each expression.

27. (a) $(3+4i)(-2+4i)$

$$-6 + 12i - 8i + 16i^2$$

$$-22 + 4i$$

(b) $(4-6i)(-5+2i)$

$$-20 + 8i + 30i - 12i^2$$

$$-8 + 38i$$

Use factoring or the quadratic formula to solve the following equations. Do not give your answers in decimal form.

28. (a) $8x^2+10x-3=0$ $(2x+3)(4x-1)$

~~$(8x-3)(2x-1)$~~

$$x = \frac{-10 \pm \sqrt{100 - 4(8)(-3)}}{2(8)}$$

$$x = \frac{-10 \pm 14}{16}$$

$$x = \frac{1}{4}, -\frac{3}{2}$$

(b) $18x^2-3x-15=0$

$$3(6x^2-x-5)$$

$$3(6x+5)(x-1)$$

$$x = 1, -\frac{5}{6}$$

(c) $4j^2+6=11j$

$$4j^2 - 11j + 6 = 0$$

$$(4j-3)(j-2)$$

$$j = \frac{3}{4}, 2$$

(c) $x^2-3x+7=0$

$$x = \frac{3 \pm \sqrt{9 - 4(1)(7)}}{2}$$

29. (a) $3x^2-x+1=0$

$$x = \frac{1 \pm \sqrt{1 - 4(3)(1)}}{6}$$

$$x = \frac{1 \pm i\sqrt{11}}{6}$$

(b) $-3x^2+4x-4=0$

~~$(-3x-2)(x+2)$~~

$$x = \frac{-4 \pm \sqrt{16 - 4(-3)(-4)}}{-6}$$

$$\frac{-4 \pm \sqrt{-16 \times 2}}{-6} \rightarrow \frac{-4 \pm 4i\sqrt{2}}{-6} \rightarrow \frac{-2 \pm 2i\sqrt{2}}{-3}$$

$$x = \frac{3 \pm \sqrt{-19}}{2}$$

$$x = \frac{3 \pm i\sqrt{19}}{2}$$

Solve the following by graphing.

30. A flare is shot upward with the initial velocity of 80 feet per second. How long does it take the flare to fall to the ground? Use the function $y=80x-16x^2$.

using 2nd Calc \rightarrow zero

$$x = 5 \text{ seconds}$$

31. A tennis ball is hit upward with the initial velocity of 36 feet per second. How long does it take the ball to hit the ground? Use the function $y=36x-16x^2$.

$$x = 2.25 \text{ seconds!}$$