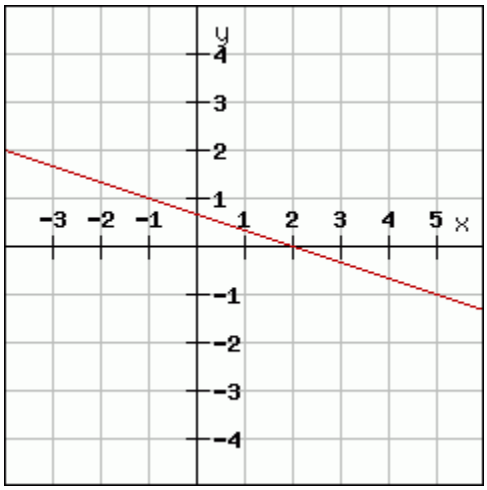
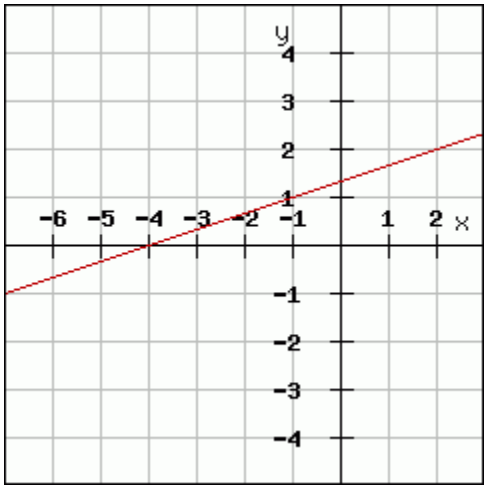
11.1 Linear Relationships

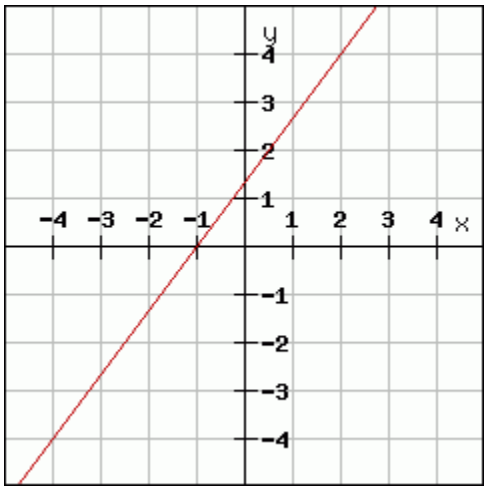
Answers

1. b=2, x-int = -8
2. b=3. X-int = 5
3. b=9, x-int = -12
4. b=8, x-int = -5
5. b=5, x-int = -6
6. b=18, x-int = 6
7. b=-2, x-int = 10
8. b=-9, x-int = 24
9. 

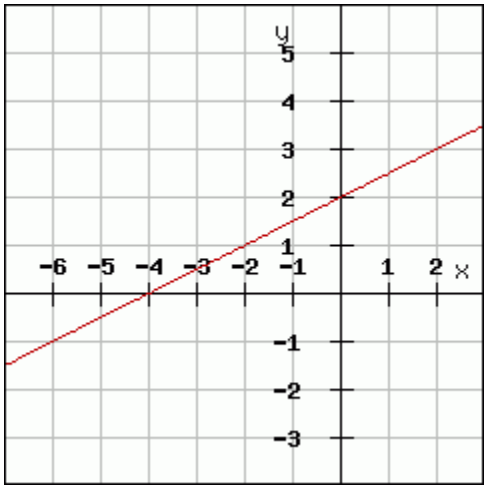
10.


y
4
3
2
1
-6 -5 -4 -3 -2 -1 1 2 x
-1
-2
-3
-4

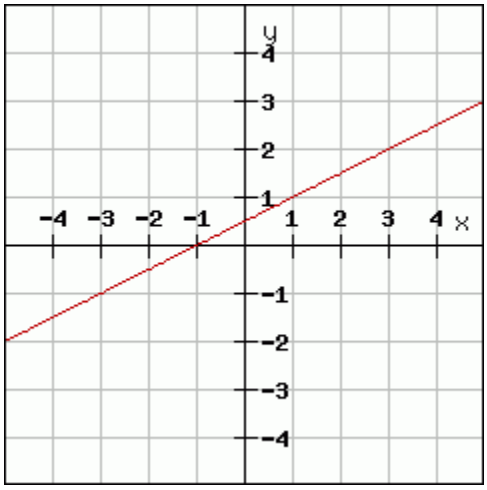
11.


y
4
3
2
1
-4 -3 -2 -1 1 2 3 4 x
-1
-2
-3
-4

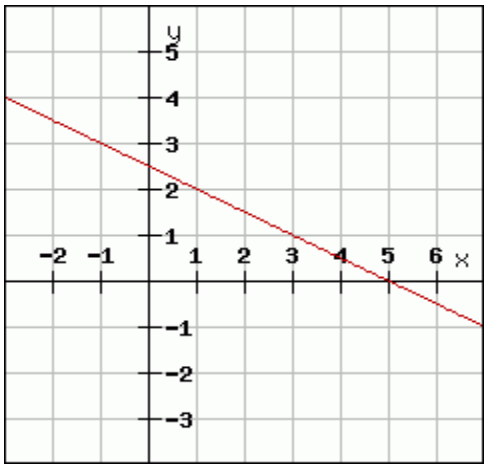
12.


y
5
4
3
2
1
-6 -5 -4 -3 -2 -1 1 2 x
-1
-2
-3

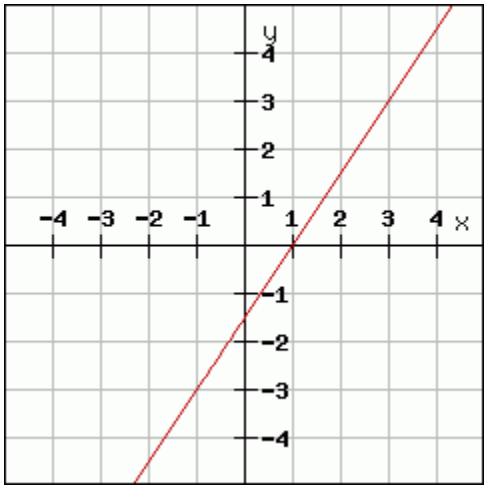
13.


y
4
3
2
1
-4 -3 -2 -1 1 2 3 4 x
-1
-2
-3
-4

14.

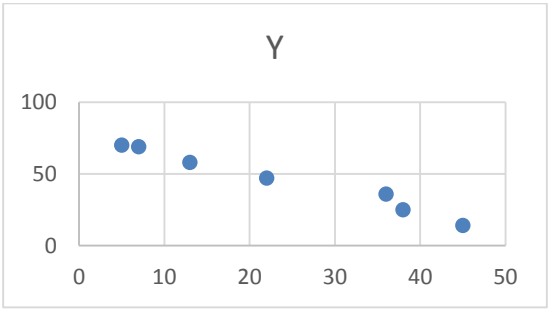

y
5
4
3
2
1
-2 -1 1 2 3 4 5 6 x
-1
-2
-3

15.


y
4
3
2
1
-4 -3 -2 -1 1 2 3 4 x
-1
-2
-3
-4

11.2 Linear Correlation Coefficient

Answers

1. No relationship
2. Strong positive relationship
3. Moderate negative relationship
4. No apparent relationship
5. Deterministic relationship
6. 82% of *y* value variation may be attributed to *x*.
7. 15% of *y* value variation may be attributed to *x*.
8. 47% of *y* value variation may be attributed to *x*.
9. 100% of *y* value variation may be attributed to *x* (deterministic relationship).
10. 0% of *y* value variation may be attributed to *x* (no apparent correlation).
11. -0.99
12. Very strong negative correlation.
13. 0.98 or 98%
14. 98% of the variation in *y* may be attributed to *x*.
15. 

11.3 Least Squares

Answers

1. The arithmetic mean of the *x* (explanatory) values.

2. The standard deviation of the *y*-values

3. The linear correlation coefficient

4. a correlates to b (the *y*-intercept), and b correlates to m (the slope)

5. The line of best fit is the straight line best representing the trend of the relationship between two variables.

6. The least squares refers to the line representing the minimum total area of squares formed by the vertical difference between data points and the line.

7. $\mu_x = 6, \mu_y = -9.6, \sigma_x = 3.5355$, and $\sigma_y = 4.6152$

8. $r = -0.9959$

9. $\boldsymbol{b} = -0.9959\left(\frac{4.6152}{3.5355}\right) = \boldsymbol{-1.3}$
   $\boldsymbol{a} = -9.6 - 1.3(6) = \boldsymbol{-17.4}$
   $\boldsymbol{Y = -1.3X - 17.4}$

10. $Y_6 = -1.3(14) - 17.4$
    $\boldsymbol{Y_6 = -35.6}$

11. $Y_0 = -1.3(0) - 17.4$
    $\boldsymbol{Y_0 = -17.4}$

12. $\mu_x = 379.21, \mu_y = 0.0517, \sigma_x = 100.01,$ and $\sigma_y = 0.0047$

13. -0.8639

14. $Y = -0.0000406X + 0.0671$

15. 0.04071

16. The research indicates a strong linear correlation, with approximately 75% of the variation in sliding coefficient attributable to the price of the skis.

11.4 Contingency Tables

Answers

1. 108 Sports, 138 Pickups, 104 Luxury

2. 175 Male, 175 Female

3. 36/175 = 20.57%

4. 71/175 = 40.57%

5. 350

6. Pickup Trucks 138/350 = 39.43%

7. Sports Cars 72/175=41.14%

8. 71/138=51.44%

9. 71/175=40.57%

10.

	Huskies	Poodles	Mastiffs	TOTAL
Beef	30	27	41	98
Chicken	40	23	19	82
TOTAL	70	50	60	180

11. 70 Huskies, 50 Poodles, 60 Mastiffs

12. 98 Beef, 82 Chicken

13. 41/60 = 68.33%

14. 41/98=41.84%

15. Mastiffs prefer beef 68.33%

16. 40 Huskies, 23 Poodles, 19 Mastiffs

17. 30 Huskies, 27 Poodles, 41 Mastiffs

18. Poodles 54% to 46%

11.5 Chi Squared Statistic

Answers

1. Data table:

1.	2. Team Fortress 2	3. World of Warcraft	4. TOTAL
5. Observed	**6. 60**	**7. 90**	**8. 200**
9. Expected	10. (0.15*200)=**30**	11. (0.35*200)=**70**	

2. Chi-square test

3. H_0: Observations support claim H_1: Observations do not support claim

4. $\chi^2 = \frac{(60-30)^2}{30} + \frac{90-70^2}{70} = 30 + 5.714 = \mathbf{35.714}$

5. $df = 1$

6. 3.8414

7. No, 35.714 > 3.8414

8. Data table:

12.	13. Import	14. Domestic	15. TOTAL
16. Observed	17. 57	18. 31	19. 88
20. Expected	21. (0.84*88)=**73.92**	22. (0.16*88)=**14.08**	23. 88

9. Chi-square test

10. H_0: Observations support claim H_1: Observations do not support claim

11. $\chi^2 = \frac{(57-73.92)^2}{73.92} + \frac{(31-14.08)^2}{14.08} = 3.873 + 20.33 = \mathbf{24.06}$

12. **One**

13. 2.7055

14. Reject: 24.06 > 2.7055

15. Since the chi-square statistic of the data, 24.06, is much greater than the critical value at the significance level of 0.10, it is very unlikely that the observed data would occur if Mack's claim were accurate.

11.6 Chi-Square II - Testing for Independence

Answers

1. To evaluate two variables for independence

2. The expected value is calculated by multiplying the column total by the row total and dividing the product by *n,* the number of samples.

3. *df* = (# of rows -1)(# of columns -1)

4. A contingency table

5. 0.05

6. Completed table:

	Cherry	Lemon	Strawberry	Other	TOTAL
Male	13 (13.25)	11 (13.72)	7 (8.52)	13 (8.52)	**44**
Female	15 (14.75)	18 (15.28)	11 (9.48)	5 (9.48)	**49**
TOTAL	**28**	**29**	**18**	**18**	**93**

7. $\chi^2 = 6.026$

8. $df = 3$

9. H_0: Favorite flavor is not dependent on gender, H_1: Favorite flavor is dependent on gender.

10. $Since\ 6.026 < 7.81$, we fail to reject.

11. Contingency table:

	Grilling	Frying	Broiling	TOTAL
Male	137	193	212	**542**
Female	110	215	220	**545**
TOTAL	**247**	**408**	**432**	**1087**

12. $\chi^2 = 4.278$

13. *df=2*

14. H_0: Cooking preference is not dependent on gender, H_1: Cooking preference is dependent on gender.

15. Fail to reject