

b)	X	Y	XY	X ²	Y ²
	13	39	507	169	1521
	13	39.5	513.5	169	1560.25
	14	39	546	196	1521
	16	38	608	256	1444
	18	38	684	324	1444
	21	37	777	441	1369
	23	35.5	816.5	529	1260.25
	22	35	770	484	1225
	19	35.5	674.5	361	1260.25
	15	36	540	225	1296
	13	37	481	169	1369
Total	187	409.5	6917.5	3323	15269.75

$$r = \frac{n \sum XY - \sum X \sum Y}{\sqrt{(n \sum X^2 - (\sum X)^2) \cdot (n \sum Y^2 - (\sum Y)^2)}}$$

$$= \frac{11 \cdot 6917.5 - 187 \cdot 409.5}{\sqrt{(11(3323) - 187^2) \cdot (11(15269.75) - 409.5^2)}}$$

$$r = -0.731$$

$$\text{Cov}(X, Y) = \frac{\sum (x_i - \bar{x}) \cdot \sum (y_i - \bar{y})}{(n-1)} = -4.4$$

$$\hat{y} = a + bx$$

$$a = \frac{\sum Y \cdot \sum X^2 - \sum X \sum XY}{n \sum X^2 - (\sum X)^2}$$

$$= \frac{409.5(3323) - (187)(6917.5)}{11(3323) - 187^2} = 42.422$$

$$11(3323) - 187^2 =$$

$$b = \frac{n \sum XY - \sum X \sum Y}{n \sum X^2 - (\sum X)^2} = \frac{11(6917.5) - 187(409.5)}{11(3323) - 187^2}$$

$$= -0.306$$

$$y = 42.422 + 0.306x$$

Slope: When temperature increases by one unit, the milk production decreases by 0.306.

$$r^2 = (\cancel{-0.306})^2 = \cancel{0.093636} \quad (-0.731)^2 = 0.5344$$

$$(c) \quad H_0: \rho = 0$$

$$H_1: \rho \neq 0$$

$$t = \frac{r \sqrt{n-2}}{\sqrt{1-r^2}} = \frac{-0.731 \sqrt{11-1}}{\sqrt{1-(-0.731)^2}} \\ = -3.213$$

$$P\text{-value} = 0.0106$$

Reject H_0 since $p\text{-value} < 0.05$. There is sufficient evidence to conclude that there is a linear relationship.

$$\hat{y} = 42.422 - 0.306 \times 17 \\ = 37.22$$