

**EXAMPLES 2 — correlation and regression**

For questions 1–3,

- calculate Pearson's correlation coefficient  $r$  and test its significance
- find the equation of the best-fitting regression line (predicting the second variable from the first)
- plot a graph showing the data points and the regression line (using the first variable as the  $x$  axis and the second variable as the  $y$  axis)
- calculate  $r^2$  to find the proportion of the variance in the second variable that is accountable for by predicting it from the first variable

**Q1.** The decay of a visual after-effect is believed to be slowed by blinking. The time for the after-effect to decay to half strength (in seconds) was measured for twelve subjects, and their blink rate (average number of blinks per minute) was also measured. Do the data show a correlation supporting the hypothesis?

Subject	1	2	3	4	5	6	7	8	9	10	11	12
Blink rate	2.1	10.3	5.9	10.0	0.5	4.5	3.1	8.2	5.2	9.7	4.6	9.7
Decay time	24.5	29.8	27.9	32.9	23.0	21.0	23.2	25.3	24.7	30.7	26.5	28.9

**Q2.** The average number of alternations per minute seen in a Necker cube was measured for 15 subjects who were also tested on the Indecision subtest of the Kentucky Personal Effectiveness Test (KPET). Is there an association between the two scores?

Subject	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Alternations per minute	20	20	21	35	15	17	19	9	4	5	3	40	22	22	17
KPET	175	130	101	200	118	120	137	120	117	120	118	222	118	191	190

**Q3.** Ten frog retinal ganglion cells were repeatedly stimulated by a flash of light of constant intensity. The average latency of the first nerve impulse and the average number of spikes produced in the 10 ms after the first impulse are given below. Is there evidence that the shorter the latency, the more spikes are produced?

Cell	A	B	C	D	E	F	G	H	I	J
Latency (ms)	102	110	120	80	65	73	97	150	111	74
No. of impulses	1.7	3.1	4.6	7.2	6.3	6.0	4.8	2.1	5.3	5.9

**Q4.** I walk in a straight line away from St Peter's Basilica in Rome. Every time I encounter an ice-cream stall, I buy a vanilla cone. In order, the prices (in €) were as follows:

1.8      1.4      2.0      1.0      1.0      1.4      0.8      0.6      1.0      0.8

Do Roman street vendors charge more for their proximity to the Vatican?

**Q5.** Ten people are repeatedly offered the choice between a small, immediate monetary reward (e.g. £10 now) and a large, delayed monetary reward (e.g. £100 next week). From their preferences, a number is computed that represents their impulsivity when choosing. At the end of the test, they lie down and the experimenter inserts a needle into their spinal space to withdraw a sample of cerebrospinal fluid, which he tests for levels of 5HIAA, a metabolite of the neurotransmitter 5HT (serotonin). The results are as follows:

Subject	A	B	C	D	E	F	G	H	I	J
Impulsivity score	85	51	76	23	55	90	42	56	21	61
5HIAA level (ng/ml)	25	28	40	37	22	35	31	18	32	29

Do these data suggest a relationship between CSF 5HIAA and choice impulsivity?