

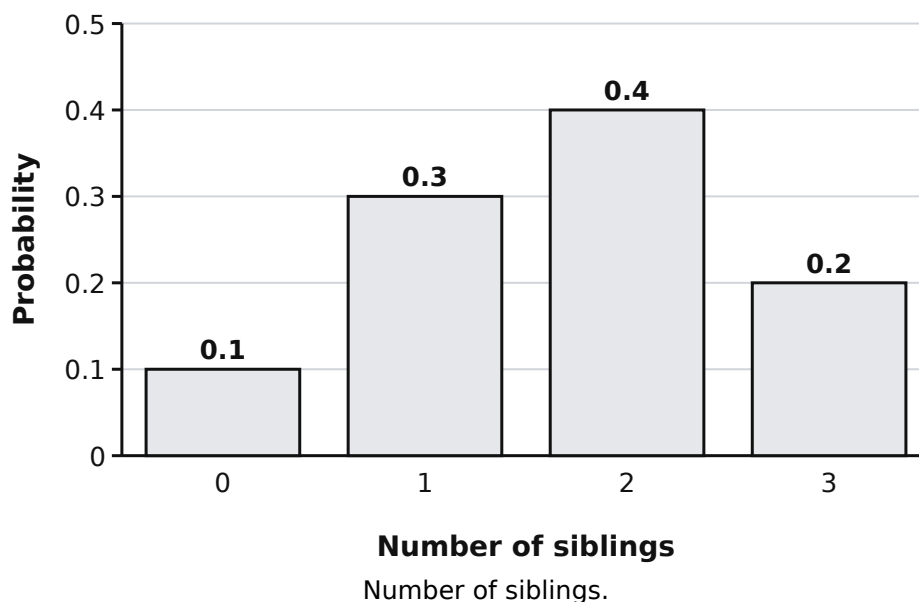
AP Statistics - Random Variables, Expected Value and Combining Variables - Test Answer Key

Common Core AP STAT 4.7, AP STAT 4.8, AP STAT 4.9, HSS-MD.A.1, HSS-MD.A.2, HSS-MD.B.5 · maths-pdf.fr/en/

Each solution includes a scoring guide. Give credit for correct products, the correct combination rule, and a conclusion that interprets the mean or standard deviation in context.

AP Statistics · Common Core State Standards: **AP STAT 4.7, AP STAT 4.8, AP STAT 4.9, HSS-MD.A.1, HSS-MD.A.2, HSS-MD.B.5**

Question 1 - Mean and SD [4 pts]



(a) $0(0.1) + 1(0.3) + 2(0.4) + 3(0.2) = 1.7$.

(b) $(0-1.7)^2(0.1) + (1-1.7)^2(0.3) + (2-1.7)^2(0.4) + (3-1.7)^2(0.2) = 0.289 + 0.147 + 0.036 + 0.338 = 0.81$,
 $\sigma = 0.9$.

(c) The average is 1.7 siblings per student in the long run.

1.7; 0.9; long-run average.

Scoring: 1 point for (a), 2 points for (b) (1 for variance, 1 for sqrt), 1 point for (c).

Question 2 - Linear transformation [2 pts]

$$5(12) - 20 = 40. \quad 5(3) = 15.$$

Mean 40, standard deviation 15.

Scoring: 1 point each.

Question 3 - Independent sum [3 pts]

Total: mean 50, sd $\sqrt{0.09+0.16}=0.5$. Difference: mean 10, sd 0.5.

Total: 50 cm, 0.5 cm. Difference: 10 cm, 0.5 cm.

Scoring: 1 point for the means, 1 point for the sd of the total, 1 point for the sd of the difference.

Question 4 - Fair game [3 pts]

Outcome	Net gain	Probability
Win	+\$9	0.1
Lose	-\$1	0.9

A carnival game.

(a) $9(0.1) + (-1)(0.9) = 0.9 - 0.9 = 0.$

(b) The expected gain is 0, so yes.

\$0; fair.

Scoring: 1 point for the setup, 1 point for 0, 1 point for fair.

Question 5 - Variances add [2 pts]

$$\sqrt{36+64}=10.$$

10; variances add, standard deviations do not.

Scoring: 1 point for 10, 1 point for the explanation.

Question 6 - 2X versus X + Y [2 pts]

2X: mean 10, sd 4. X + Y: mean 10, sd $\sqrt{8} \approx 2.83$.

Same mean 10, but sd 4 for 2X and 2.83 for X + Y.

Scoring: 1 point for each of the two sets.

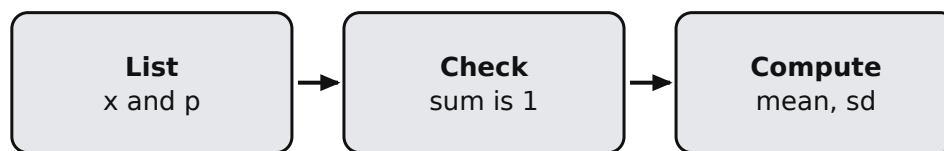
Question 7 - Insurance [2 pts]

Profit: 60 with probability 0.9; 60 - 400 = -340 with probability 0.1.
 $60(0.9) - 340(0.1) = 54 - 34 = 20$.

\$20 per warranty.

Scoring: 1 point for the profit values, 1 point for 20.

Question 8 - Valid distribution [2 pts]



Steps.

$k = 1 - 0.15 - 0.35 - 0.25 = 0.25$. $P(X \geq 3) = 0.25 + 0.25 = 0.50$.

k = 0.25; P = 0.50.

Scoring: 1 point each.

Total
20 points