

Probability and Statistics: math test solutions, Grade 11 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Counting

/ 3 pts

(a) Order matters: $P(9, 3) = 9 \times 8 \times 7 = 504$. (1 pt)

(b) Order does not matter: $C(9, 3) = \frac{504}{6} = 84$. (1 pt)

(c) 7 letters with L twice and O twice: $\frac{7!}{2!2!} = \frac{5040}{4} = 1260$. (1 pt)

2 Marbles

/ 4 pts

(a) $\frac{5}{10} \times \frac{4}{9} = \frac{20}{90} = \frac{2}{9}$. (1.5 pts)

(b) Red: $\frac{20}{90}$. Blue: $\frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$. Yellow: $\frac{2}{10} \times \frac{1}{9} = \frac{2}{90}$. Sum: $\frac{28}{90} = \frac{14}{45}$. (1.5 pts)

(c) The draws are independent: $\frac{5}{10} \times \frac{5}{10} = \frac{1}{4}$. (1 pt)

3 Conditional probability

/ 3 pts

- (a) $\frac{36}{80} = 0.45$. (1 pt)
- (b) There are $36 + 42 = 78$ purchases: $\frac{36}{78} = \frac{6}{13} \approx 0.462$. (1 pt)
- (c) $P(\text{purchase}) = \frac{78}{150} = 0.52 \neq 0.45$, so the events are not independent. (1 pt)

4 Binomial model

/ 3 pts

- (a) $C(6, 5)(0.9)^5(0.1) = 6 \times 0.59049 \times 0.1 \approx 0.3543$. (1 pt)
- (b) Add $P(X = 6) = 0.9^6 \approx 0.5314$: total ≈ 0.8857 . (1 pt)
- (c) Mean = $6 \times 0.9 = 5.4$; $\sigma = \sqrt{6 \times 0.9 \times 0.1} = \sqrt{0.54} \approx 0.735$. (1 pt)

5 Watermelons

/ 4 pts

- (a) $z = \frac{15 - 12}{1.5} = 2$ (1 pt) and $z = \frac{10.5 - 12}{1.5} = -1$. (1 pt)
- (b) 9 and 15 are $\mu \pm 2\sigma$: about 95%. (1 pt)
- (c) 13.5 is $\mu + \sigma$: $\frac{100 - 68}{2} = 16\%$. (1 pt)

6 Poll and bias

/ 3 pts

- (a) $ME = 1.96 \sqrt{\frac{0.54 \times 0.46}{900}} \approx 1.96 \times 0.0166 \approx 0.033$, about 3.3%. (1 pt)
- (b) The interval is about 50.7% to 57.3%. It lies entirely above 50%, so a majority is supported at the 95% level. (1 pt)
- (c) It is a convenience sample: gym users are not representative of the whole population, so the result is biased no matter how many people answer. (1 pt)



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