

“None” means “None of the previous answers is correct.”

- How many license plates consisting of two letters followed by four digits are possible?  
(a)  $26^2 10^4$  (b)  $C(26,2) C(10,4)$  (c)  $P(26,2) P(10,4)$  (d)  $\frac{26^2 10^4}{2!4!}$  (e) None
- How many different ways can a 30-member football team select a captain and an assistant captain?  
(a) 59 (b)  $30!$  (c)  $\frac{30 \cdot 29}{2}$  (d)  $30^2$  (e) None
- A package contains 100 fuses, of which 10 are defective. A sample of 5 fuses is selected at random. How many samples contain exactly two defective fuses?  
(a)  $C(5,2)100^5$  (b)  $C(100,3) C(10,2)$  (c)  $C(90,3) C(10,2)$  (d)  $\frac{P(100,5)}{2!3!}$  (e) None
- Calculate  $(n - 1) \cdot (n - 2)!$ .  
(a) 0 (b)  $n$  (c)  $n - 1$  (d)  $(n - 1)!$  (e) None
- Refer to the figure below.

How many routes go from A to B through C?

- (a)  $C(11,4)$  (b)  $C(5,2)C(6,2)$  (c)  $\frac{11!}{3!4!}$  (d)  $C(7,3)C(4,2)$  (e) None

6. Determine the last three terms in the binomial expansion  $(x + y)^{12}$ .

- (a)  $66x^{10}y^2 + 12x^{11}y + x^{12}$  (b)  $132x^{10}y^2 + 12x^{11}y + x^{12}$  (c)  $66x^{10}y^2 - 12x^{11}y + x^{12}$   
(d)  $66x^2y^{10} + 12xy^{11} + y^{12}$  (e) None

7. An experiment consists of tossing a coin four times and observing the sequence of heads and tails. Compute  $\Pr(E)$ , where  $E$  is the event that more heads occur than tails.

- (a)  $1/2$    (b)  $5/16$    (c)  $3/8$    (d)  $7/16$    (e) None

8. Three Marksmen A, B, and C are in a three-way duel. Marksman A is a 50% shot, marksman B is an 80% shot, and marksman C is a 100% shot. They agree to take turns, with each man having exactly one shot on his turn, in the following rotation: A shoots first, B shoots second, C shoots third, then back to A again. Once shot, a marksman is obviously eliminated from the rotation. They continue shooting until only one person is left standing. On A's first shot, his best strategy is to

- (a) aim at B   (b) aim at C   (c) miss on purpose   (d) None

9. If  $A$  and  $B$  are *independent* and  $\Pr(A) = .3$  and  $\Pr(B) = .6$ , then  $\Pr(A \cup B) =$

- (a) 0   (b) .18   (c) .72   (d) .90   (e) None

10. Suppose that  $\Pr(A) = .85$ ,  $\Pr(B) = .4$ , and  $\Pr(A \cap B) = .3$ . Then  $\Pr(B | A') =$

- (a)  $\frac{1}{5}$    (b)  $\frac{5}{11}$    (c)  $\frac{11}{7}$    (d)  $\frac{2}{3}$    (e) None

11. If the probability of an event is  $2/7$ , what are the corresponding odds?

- (a)  $2/7$    (b)  $5/2$    (c)  $7/2$    (d)  $5/7$    (e) None

12. If  $E$  and  $F$  are *mutually exclusive* events, then  $\Pr(E | F)$  equals

- (a)  $\Pr(E)$    (b)  $\Pr(F)$    (c)  $\Pr(E)\Pr(F)$    (d) 0   (e) None

13. A school with 400 students offers Math and English. This semester 250 students are *not* taking Math, 250 are enrolled in English, and 100 signed up for both. If a student is selected at random, what is the probability she is in neither class?

- (a)  $\frac{1}{8}$    (b)  $\frac{1}{4}$    (c)  $\frac{3}{8}$    (d) 0   (e) None

14. A basketball player with a free-throw shooting average of .6 is on the line to shoot two free throws. Assuming that the two throws are independent, what is the probability that the player will score exactly 1 point?

- (a) .24   (b) .36   (c) .48   (d) .60   (e) None

15. Assume that following data: 20% of all Americans smoke, 5% of all smokers develop lung cancer; while 0.1% of all nonsmokers develop lung cancer. If a person has lung cancer, what is the probability that he or she smokes?

- (a)  $5/9$    (b)  $25/27$    (c)  $50/51$    (d)  $125/126$    (e) None