

3. In how many ways can a jury of nine be selected from twenty candidates ?

(a) $P(29, 20)$

(c) $C(29, 20)$

(e) $P(20, 9)$

(b) $C(20, 9)$

(d) $C(11, 9)$

Solution :

The order is not important, so we have combinations of 20 objects (candidates) taken as 9:

$$C(20, 9) = \frac{20!}{9! \cdot (20 - 9)!} = \frac{20!}{9! \cdot 11!} = 167960 .$$

However, the computations are not necessary.

The correct answer is (b) . ■

4. Sue buys a car by putting \$ 2000 down and then getting a 5 year loan at 7.2 %. Her monthly payment is \$ 250. What was the price of the car ?

(a) \$ 21, 477

(c) \$ 23, 236

(e) \$ 19, 991

(b) \$ 12, 742

(d) \$ 14, 566

Solution :

The present value of an annuity can be computed by using the formula:

$$P = R \cdot \left[\frac{1 - \left(1 + \frac{r}{m}\right)^{-m \cdot t}}{\frac{r}{m}} \right] ,$$

since we know how much Sue pays monthly for the loan, but not how much she loaned.

In our case, $r = 0.072$, $m = 12$ (monthly), and $t = 5$ (years). But she loans only a part of the money that she needs to buy the car, because she put \$ 2,000 down. Therefore, the cost of the car is:

$$\begin{aligned} C &= 2,000 + P = 2,000 + 250 \cdot \left[\frac{1 - \left(1 + \frac{0.072}{12}\right)^{-12 \cdot 5}}{\frac{0.072}{12}} \right] = \\ &= 2,000 + 12,565.532506872165 \approx 2,000 + 12,566 = 14,566 . \end{aligned}$$

The correct answer is (d) . ■

5. How much should I put in an account now if it earns 8.4 % compounded monthly and I want \$ 15,000 in the account in 5 years?

(a) \$ 7,204

(c) \$ 8,732

(e) \$ 10,021

(b) \$ 10,563

(d) \$ 9,870

Solution :

The present value formula for compounded interest can be computed by using the formula:

$$P = A \cdot \left(1 + \frac{r}{m}\right)^{-m \cdot t},$$

since we know the future value, \$ 15,000, and we want to compute the present value.

In our case, $r = 0.084$, $m = 12$ (monthly) and $t = 5$ (years). Therefore,

$$P = 15,000 \cdot \left(1 + \frac{0.084}{12}\right)^{-12 \cdot 5} = 9870.133477564383 \approx \$9,870 .$$

The correct answer is (d) . ■

6. Sam puts \$ 5,000 into an account that earns 10 % simple interest. How much will he have after 4 years ?

(a) \$ 7,321

(c) \$ 7,447

(e) \$ 7,000

(b) \$ 3,415

(d) \$ 5,200

Solution :

The accumulated amount of a simple interest can be computed by using the formula:

$$A = P \cdot (1 + r \cdot t) .$$

In our case, $r = 0.10$ and $t = 4$. Therefore,

$$A = 5,000 \cdot (1 + 0.1 \cdot 4) = \$7,000 .$$

The correct answer is (e) . ■

7. Compute $P(1000, 1)$.

- (a) Too enormous to write down (c) 999 (e) 1000
(b) 1 (d) 999000

Solution :

The formula for permutations of n distinct objects taken as r at a time is:

$$P(n, r) = \frac{n!}{(n-r)!} .$$

Therefore,

$$P(1000, 1) = \frac{1000!}{(1000-1)!} = \frac{1000!}{999!} = \frac{999! \cdot 1000}{999!} = 1000 .$$

There is not need to compute $1000!$ above, because it gets simplified. Using a calculator, you seek the nPr button : $1000P1 \rightarrow 1000$.

The correct answer is (e) .

8. If $A = \{a, d, g, j\}$ and $B = \{a, b, c, d, p, q, r\}$ then $A \cup B =$

- (a) $\{a, d\}$ (c) $\{h, i, e, d, i, s\}$ (e) None of the above
(b) $\{b, c, g, j, p, q, r\}$ (d) $\{a, b, c, d, g, j, p, q, r\}$

Solution :

The union of the sets A and B is contains all elements that there are in either A or B (not only the common elements). Therefore,

$$A \cup B = \{a, d, g, j\} \cup \{a, b, c, d, p, q, r\} = \{a, b, c, d, g, j, p, q, r\} ,$$

where the common elements are taken once at a time.

The correct answer is (d) . ■

9. Jack and Sally want to buy a house that costs \$ 210,000. They put \$ 20,000 down and get a 20 year loan at 7.8 %. What will their monthly mortgage payment will be ?

- (a) \$ 3,748 (c) \$ 1,349 (e) \$ 1,566
(b) \$ 1,730 (d) \$ 792

Solution :

The formula for loan amortization is:

$$R = \frac{P \cdot \frac{r}{m}}{1 - \left(1 + \frac{r}{m}\right)^{-m \cdot t}} .$$

