

# CSCA Mathematics

**Sample Test**

$$\tan x + \tan y = \frac{\sin(x+y)}{\cos x \cos y}$$
$$a^2 + b^2 = c^2$$

1

If  $a < b$  and  $c < d$ , and also  $a$  and  $b$  are positive while  $c$  and  $d$  are negative, which of the following must be true ( )?

- A.  $ad < bc$
- B.  $\frac{a}{c} > \frac{b}{d}$
- C.  $ac > bd$
- D.  $a + d < b + c$

2

If  $\cos \alpha = -\frac{1}{4}$  and  $\alpha$  lies in the second quadrant, then  $\sin 2\alpha$  ( ).

- A.  $-\frac{\sqrt{15}}{8}$
- B.  $\frac{\sqrt{15}}{8}$
- C.  $-\frac{\sqrt{15}}{4}$
- D.  $\frac{\sqrt{15}}{4}$

3

The sum of the first  $n$  terms of a sequence  $\{a_n\}$  is given by  $S_n = n^2 + 2n + 1$ , then  $a_{10}$  ( ).

- A. 19
- B. 20
- C. 21
- D. 121

4

If  $\cos \alpha = -\frac{1}{2}$  and  $\pi < \alpha < \frac{3\pi}{2}$ , then  $\cos\left(\frac{\alpha}{2}\right) = ( \quad )$ .

- A.  $\frac{\sqrt{3}}{2}$
- B.  $-\frac{\sqrt{3}}{2}$
- C.  $\frac{1}{2}$
- D.  $-\frac{1}{2}$

5

Which of the following is correct ( )?

- A.  $(0.4)^{-1.3} > (0.3)^{-1.3}$
- B.  $(1.8)^{0.2} > (1.6)^{0.2}$
- C.  $(2.5)^{-0.8} < (2.5)^{-1.1}$
- D.  $(0.2)^{1.4} > (0.2)^{1.1}$

6

A bag contains five equal-sized balls: three black and two red. Two balls are drawn one after another without replacement. If at least one of the balls drawn is black, the probability that both balls are black is ( ).

- A.  $\frac{1}{10}$
- B.  $\frac{3}{10}$
- C.  $\frac{1}{3}$
- D.  $\frac{9}{10}$

7

An ellipse  $C$  has center at the origin and its foci are on the  $x$ -axis. It passes through the point  $(0, 2)$  and has eccentricity  $\frac{3}{5}$ . The equation of  $C$  is ( )?

A.  $\frac{4x^2}{25} + \frac{y^2}{4} = 1$

B.  $\frac{x^2}{4} + \frac{4y^2}{25} = 1$

C.  $\frac{x^2}{25} + \frac{y^2}{4} = 1$

D.  $\frac{4x^2}{9} + \frac{y^2}{4} = 1$

8

Suppose a complex number  $z$  satisfies  $(2 - i)z + (1 + i)\bar{z} = 5 - i$ , where  $\bar{z}$  is the complex conjugate of  $z$ . Then  $z = ( )$ .

A.  $\frac{7}{3} - i$

B.  $-\frac{7}{3} - i$

C.  $\frac{7}{3} + i$

D.  $-1 + \frac{7}{3}i$

9

The minimum value of the function  $g(x) = x^3 - 3x^2 - 9x + 5$  on the interval  $[-2, 4]$  is ( ).

- A. -22
- B. -15
- C. 3
- D. 4

10

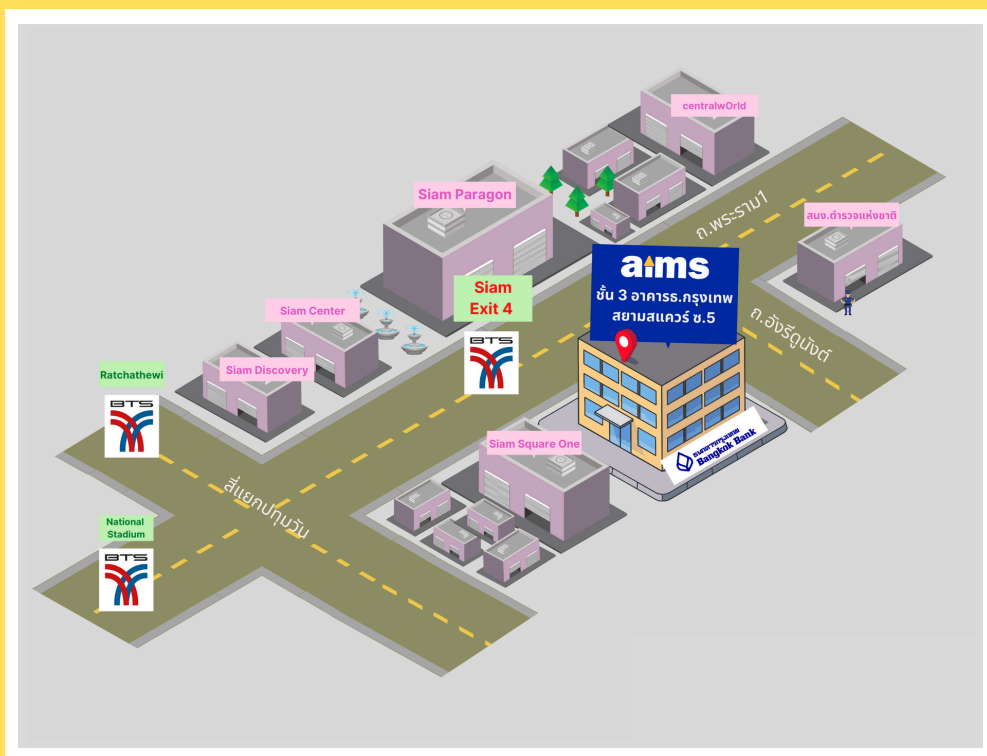
The angle between the planes  $x + y - 2z + 1 = 0$  and  $2x - y + z - 4 = 0$  is ( ).

- A.  $\frac{\pi}{3}$
- B.  $\frac{2\pi}{3}$
- C.  $\arccos \frac{1}{6}$
- D.  $\arccos \frac{2}{3}$

## Answers

1. B
2. A
3. C
4. D
5. B
6. C
7. A
8. A
9. A
10. C





## aims Siam Square


BTS Siam Exit 4 (opposite to Siam Paragon)  
3rd Fl., Bangkok Bank Building (Siam Square Soi 5)  
Rama 1 Rd., Pathumwan, Bangkok




LINE @aims2

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 02-254-9300  
02-658-4253, 02-658-4254