

2022-2023 AUT

Admission Examination Sample

Mathematics



Test ID Number	
Full Name	
Major	

- These sample questions for your references. In real exam there will be 25 questions for 90 minutes.

1. Find the sum of all **INTEGERS** x satisfying the following inequality:

$$x^2 - 6x \leq 1$$

- ① 7 ② 14 ③ 21 ④ 28 ⑤ 35

2. If $\cos x = -5$ with $\frac{\pi}{2} < x < \pi$, then $\sin x$ is equal to

- ① $-\frac{12}{13}$ ② $-\frac{5}{12}$ ③ $\frac{1}{3}$ ④ $\frac{5}{12}$ ⑤ $\frac{12}{13}$

3. If $a + b = 5$, $ab = -\frac{39}{4}$ and $a > b$, then $a^2 - b^2$ is equal to

- ① 10 ② 20 ③ 30 ④ 40 ⑤ 50

4. Let $A = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$ and $A^4 = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$. Then, $a + b + c + d$ is equal to

- ① 3 ② 5 ③ 9 ④ 13 ⑤ 17

5. Evaluate the following integral :

$$\int_0^{e^2} \frac{dx}{1+x}$$

- ① $\frac{1}{e}$ ② $\frac{1}{2}$ ③ 2 ④ e ⑤ $\ln(e^2+1)$

6. Evaluate the following limit :

$$\lim_{x \rightarrow 0} \frac{2 \sin x}{x}$$

- ① 2 ② -2 ③ 1 ④ -1 ⑤ 0

7. If $f(x) = \frac{x^2+ax+b}{x-1}$ has a local minimum value of 11 at $x = 3$, then ab is equal to

- ① -15 ② -10 ③ 5 ④ 10 ⑤ 15

8. If $\sin \alpha = \frac{3}{5}$, then $\cos(2\alpha)$ is equal

- ② $\frac{7}{25}$ ② $-\frac{7}{25}$ ③ $\frac{9}{25}$ ④ $-\frac{9}{25}$ ⑤ $\frac{2}{5}$

9. Find the area of region bounded by the curves $y = x^2$ and $y = 6 - |x|$.

- ① $\frac{20}{3}$ ② 7 ③ $\frac{22}{3}$ ④ 11 ⑤ $\frac{44}{3}$

10. Find the **POSITIVE** real number k such that the equation

$$3x^4 - 4x^3 - 12x^2 + 5 - k = 0$$

has **THREE DISTINCT** real roots.

- ① 5 ② 4 ③ 3 ④ 2 ⑤ 1