



## AUT Admission Sample Question

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1. Let  $f(x) = x^2 - 2x + a$ . The graph of  $f(x)$  meets the graph of  $y = 0$  at only one point. Find  $a$ .

- ① -1    ② 0    ③ 1    ④ 2    ⑤ 3

2. When  $z = \frac{1+i}{\sqrt{2}}$ , find  $z^3$ .

- ① 1    ② i    ③ -i    ④  $\frac{1+i}{\sqrt{2}}$     ⑤  $\frac{-1+i}{\sqrt{2}}$

3. Simplify the following:

$$\lim_{x \rightarrow \infty} \left( \frac{3^x + 5^{x+1}}{2^x - 5^{x-1}} \right)$$

- ① -63    ② -25    ③  $\frac{8}{3}$     ④  $-\frac{8}{3}$     ⑤ 1

4. Find the minimum value of  $x^2 - 4x + 8$ .

- ① 2    ② 4    ③ 6    ④ 8    ⑤ 10

5. Let  $A = \begin{pmatrix} 2 & a \\ 0 & 1 \end{pmatrix}$  and if  $A^2 = \begin{pmatrix} b & 3 \\ c & d \end{pmatrix}$ , what is  $a + b + c + d$ ?

- ① 2    ② 3    ③ 4    ④ 5    ⑤ 6

6. Jeff bought a used car for \$4000 and paid 20% deposit. How much does he still have to pay?

- ① \$800    ② \$2000    ③ \$2500    ④ \$3200    ⑤ None of these

7. Evaluate  $\int_5^6 (x-5)^4 x \, dx$ .

- ①  $1\frac{1}{6}$     ②  $1\frac{1}{7}$     ③  $1\frac{1}{8}$     ④  $1\frac{1}{9}$     ⑤ None of these



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8. When  $2^a = 3^b = 8$  and  $\frac{a}{b} = \log_2 c$ , find  $c$ .

- ① 2      ② 3      ③ 4      ④ 5      ⑤ 6

9. Evaluate  $\lim_{x \rightarrow 0} \left( \frac{\cos 3x - 1}{x^2} \right)$

- ①  $\frac{9}{2}$       ②  $\frac{3}{2}$       ③  $-\frac{2}{3}$       ④  $-\frac{9}{2}$       ⑤ None of these

10. When  $a - \frac{1}{a} = 2$ , find  $\left| a + \frac{1}{a} \right|$ .

- ①  $2\sqrt{2}$       ②  $\sqrt{3}$       ③  $-2\sqrt{5}$       ④  $-\sqrt{2}$       ⑤  $2\sqrt{5}$