



2025 TESTIFI EXAMINATION

Irrational Numbers

Solutions and Marking Guidelines

Section I

2 marks

Questions 1–2

Question 1 (1 mark)

1

C

$0.\overline{37}$ is rational (recurring decimal can be written as a fraction), 0.25 is rational ($= \frac{1}{4}$), $\sqrt{7}$ is irrational (non-repeating, non-terminating decimal that cannot be written as $\frac{a}{b}$), $\frac{5}{8}$ is rational (already in fraction form).

Question 2 (1 mark)

1

B

$\sqrt{2}$ is irrational because it cannot be expressed as a fraction $\frac{a}{b}$ where a and b are integers with $b \neq 0$. The decimal expansion of $\sqrt{2}$ is non-repeating and non-terminating. The other options are rational: $\frac{1}{2} = 0.5$, $0.75 = \frac{3}{4}$, and $3 = \frac{3}{1}$.

Section II

10 marks

Questions 3–7

Question 3 (1 marks)

1

π is irrational because it cannot be expressed as a fraction $\frac{a}{b}$ where a and b are integers. The other numbers are rational: $\frac{1}{2}$ is already a fraction, $0.75 = \frac{3}{4}$, and $3 = \frac{3}{1}$.

Question 4 (1 marks)

1

$\sqrt{2}$ is irrational because it cannot be written as a fraction $\frac{a}{b}$ where a and b are integers. The other numbers are rational: $0.5 = \frac{1}{2}$, $\frac{2}{3}$ is already a fraction, and $4 = \frac{4}{1}$.

Question 5 (2 marks)

2

0.101010... is rational because it has a repeating pattern and can be written as $\frac{10}{99}$.

0.5 is rational because it can be written as $\frac{1}{2}$.

$\sqrt{3}$ is irrational because it cannot be expressed as a fraction $\frac{a}{b}$.

0.333... is rational because it repeats and equals $\frac{1}{3}$.

2.718281... (which represents e) is irrational because it is non-repeating and non-terminating.

Question 6 (3 marks)

3

$\sqrt{5}$ lies between 2 and 3.

Since $2^2 = 4$ and $3^2 = 9$, and $4 < 5 < 9$, we know that $2 < \sqrt{5} < 3$.

More precisely, since $2.2^2 = 4.84$ and $2.3^2 = 5.29$, $\sqrt{5}$ is approximately 2.2, placing it closer to 2 than to 3 on the number line.

Question 7 (3 marks)

3

π lies between 3 and 4.

We know that π represents the ratio of a circle's circumference to its diameter. From geometric knowledge, $\pi \approx 3.14159...$

Since $3 < 3.14159... < 4$, π lies between 3 and 4, much closer to 3 than to 4 on the number line.