

1. (a) Find an irrational number between 8 and 9.

$$\begin{aligned} \text{Since } 8^2 &= 64 \text{ and } 9^2 = 81 \\ 8 &< \sqrt{65} < 9 \end{aligned}$$

- (b) Estimate $\sqrt{2}$ correct to the tenths place.

$$\begin{aligned} \text{Since } 1.4^2 &= 1.96 \text{ and } 1.5^2 = 2.25, \\ 1.4 &< \sqrt{2} < 1.5 \end{aligned}$$

2. For each equation, either solve the equation to find all possible real number solutions, or explain why no solution exists.

(a) $3x^2 - 21 = 0$

$$\begin{aligned} 3x^2 - 21 &= 0 \\ 3x^2 &= 21 \\ x^2 &= 7 \\ x &= \pm\sqrt{7} \end{aligned}$$

(b) $x^2 + 9 = 0$

$$\begin{aligned} x^2 + 9 &= 0 \\ x^2 &= -9 \\ \text{No solution.} \end{aligned}$$

(c) $x^3 + 12 = 0$

$$\begin{aligned} x^3 + 12 &= 0 \\ x^3 &= -12 \\ x &= \sqrt[3]{-12} = -\sqrt[3]{12} \end{aligned}$$

(d) $(x + 2)^4 - 1 = 0$

$$\begin{aligned} (x + 2)^4 - 1 &= 0 \\ (x + 2)^4 &= 1 \\ x + 2 &= \pm 1 \\ x &= -2 \pm 1 \\ x &= -3 \text{ or } x = -1 \end{aligned}$$

3. Determine if each statement is TRUE or FALSE. (Write TRUE or FALSE, not just T or F.)

- (a) Every integer is a real number.

TRUE

- (b) Every real number is an irrational number.

FALSE (2 is real but it is not irrational)