1. (a) 0  (b) 1  (c) 1  (d) e  (e) \( \pi \)

2. \( 0 < 1 < \sqrt{2} = 1.414 \ldots < e = 2.718 \ldots < \pi = 3.141 \ldots \)

3. (a) \( A = \{3, 5, 7, 11, 13, 17, 19, 23\} \)
   (b) \( B = \{5, 9, 13, 17, 21\} \)
   (c) \( A \cup B = \{3, 5, 7, 9, 11, 13, 17, 19, 21, 23\} \)
   (d) \( A \cap B = \{5, 13, 17\} \)

4. (a) \((x + y)^2 = x^2 + 2xy + y^2\)
   (b) \((x - y)^2 = x^2 - 2xy + y^2\)
   (c) \((x^2 - y^2) = (x + y)(x - y)\)

5. (a) \(x^n \times x^m = x^{n+m}\)
   (b) \(x^n \times y^n = (xy)^n\)
   (c) \(\log_a(y) = x \implies a^x = y\)
   (d) \(\log_a(x) + \log_a(y) = \log_a(z) \implies z = xy\)

6. (a) \(4! = 24\)
   (b) \(\frac{(n+1)!}{n!} = n + 1\)

7. (a) \(x = 13\)  \(y = 7\)
   (b) \(x_1 = 5\)  \(x_2 = -3\)

8. The 8 possible outcomes are: HHH, HHT, HTH, HTT, THH, THT, TTH, and TTT.
   (a) \(\frac{1}{4}\) for HHH or TTT.
   (b) \(\frac{3}{8}\) for HTT or THT or TTH.

9. (a) \(c = \sqrt{a^2 + b^2}\)
   (b) (i) 180°  (ii) 360°
   (c) (i) 2\(\pi\)r  (ii) \(\pi\)r^2

10. (a) \(c = n^2\)
    (b) \(c = 2^n\)

11. (a) \(1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}\)
    (b) \(1 + 2 + 4 + 8 + \cdots + 2^n = 2^{n+1} - 1\)

12. \(\log(n) < n < n^2 < 2^n\)