2210 Discrete Structures Prerequisite Quiz: **Solutions**

1. (a) $\underline{0}$ (b) $\underline{1}$ (c) $\underline{\pi}$ (d) $\underline{e}$ (e) $\underline{i}$

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

3. (a) $\underline{3 + 3 \times 3 = 3 + (3 \times 3) = 3 + 9 = 12}$
   (b) $\underline{4 \div 4 \div 4 = (4 \div 4) \div 4 = 1 \div 4 = 1/4}$

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

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

6. (a) $4! = 4 \times 3 \times 2 \times 1 = \underline{24}$
   (b) $\frac{(n+1)!}{n!} = \frac{(n+1)\times n\times(n-1)\times\cdots\times 2\times 1}{n\times(n-1)\times\cdots\times 2\times 1} = \underline{n + 1}$

7. (a) $\underline{x = 13}$ $\underline{y = 7}$
   (b) $x^2 - 2x - 15 = (x - 5)(x + 3) = 0 \implies \underline{x_1 = 5}$ and $\underline{x_2 = -3}$

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

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

10. (a) $\underline{c = n^2}$
    (b) $\underline{c = 2^n}$

11. $\underline{\log(n)}$ $<$ $\underline{n}$ $<$ $\underline{n^2}$ $<$ $\underline{2^n}$