

$$2(2k+1)^2 + 5(2k+1) + 4$$

$$2(2k+1)(2k+1) + 5k + 5 + 4$$

$$2(4k^2 + 2k + 2k + 1) + 5k + 9$$

$$8k^2 + 16k + 1 + 5k + 9$$

$$8k^2 + 21k + 10$$

$$(8k^2 + 21k) \text{ is odd} \therefore 2n^2 + 5n + 4 \text{ is odd}$$

$$1) \quad P(0) =$$

$$-\frac{2}{5}^0 = \frac{5}{7} \left( 1 - \left( -\frac{2}{5} \right)^{0+1} \right)$$

$$1 = \frac{5}{7} \left( 1 - \frac{-2}{5} \right)$$

$$1 = \frac{5}{7} \left( \frac{7}{5} \right)$$

$$1 = 1 \checkmark$$

$$P(k+1)$$

$$\left(-\frac{2}{5}\right)^{k+1} = \frac{5}{7} \left(1 - \left(-\frac{2}{5}\right)^{(k+1)+1}\right)$$

$$\left(-\frac{2}{5}\right)^k \cdot \left(-\frac{2}{5}\right) = \frac{5}{7} \left(1 - \left(-\frac{2}{5}\right)^k \cdot \left(-\frac{2}{5}\right)^2\right)$$

$$= \frac{5}{7} \left(1 - \left(-\frac{2}{5}\right)^k \cdot \frac{4}{25}\right)$$

$$= \frac{5}{7} \cdot \frac{4}{25} \left(\frac{25}{4} - \left(-\frac{2}{5}\right)^k\right)$$

$$= \frac{1}{7} \left(\frac{20}{4} - \left(-\frac{2}{5}\right)^k\right)$$

3.  $\sqrt{5} = \frac{x}{y}$

$$5 = \frac{x^2}{y^2}$$

$$5xy^2 = \frac{x^2}{y^2} + y^2$$

$$5xy^2 = x^2$$

since 5 is prime factor, is not among a

4.

a) True

b) True

c) True

d) False

$$5. a) \bar{E} \cap D$$

$$b) \bar{E} \cup B$$

$$c) \bar{E} \cap D \cap A$$

$$d) E \cap (C \cup D) \cap \bar{A}$$

$$\begin{aligned} 6. (A - B) - C &= A - (B \cup C) \\ &= (A \cap \bar{B}) \cap \bar{C} \\ &= A \cap (\bar{B} \cap \bar{C}) \\ &= A \cap \overline{(B \cup C)} \\ &= A - (B \cup C) \end{aligned}$$

7.

$$a) \{-2, 2\} \times \{\emptyset, \{2\}, \{2\}, \{-2, 2\}\}$$

$$= \{(-2, \emptyset), (-2, \{2\}), (-2, \{2\}), (-2, \{-2, 2\}), (2, \emptyset), (2, \{2\}), (2, \{2\}), (2, \{-2, 2\})\}$$

$$b) \{(-2, -2), (-2, 2), (2, -2), (2, 2)\}$$

$$= \{-2, 2\} \times \{-2, 2\}$$

b.  $\{\emptyset, \{(-2, -2)\}, \{(-2, 2)\}, \{(2, -2)\}, \{(2, 2)\}, \{(2, -2), (-2, 2)\},$   
 $\{(-2, -2), (-2, 2)\}, \{(-2, -2), (2, -2)\}, \{(2, -2), (2, 2)\}, \{(-2, 2), (2, -2)\},$   
 $\{(-2, 2), (2, 2)\}, \{(2, -2), (2, 2)\}, \{(-2, -2), (-2, 2), (2, -2)\},$   
 $\{(-2, 2), (2, -2), (2, 2)\}, \{(2, -2), (2, 2)\}, \{(-2, -2), (-2, 2), (2, -2), (2, 2)\}\}$

$$\begin{aligned}
 8) \quad (u, v) \in A \times (B \cap C) &= u \in A \wedge v \in (B \cap C) \\
 &= u \in A \wedge (v \in B \wedge v \in C) \\
 &= (u \in A \wedge v \in B) \wedge (u \in A \wedge v \in C) \\
 &= (u, v) \in A \times B \wedge (u, v) \in A \times C \\
 &= (u, v) \in (A \times B) \cup (A \times C) \\
 \therefore A \times (B \cup C) &= (A \times B) \cup (A \times C)
 \end{aligned}$$