



2.

$$C_2^6 = \frac{6!}{2!4!} = \frac{6 \cdot 5}{2 \cdot 1} = 15$$

- 1) 0 0 0 0 1 1 = 3
- 2) 0 0 0 1 0 1 = 5
- 3) 0 0 0 1 1 0 = 6
- 4) 0 0 1 0 0 1 = 9
- 5) 0 0 1 0 1 0 = 10
- 6) 0 0 1 1 0 0 = 12
- 7) 0 1 0 0 0 1 = 17
- 8) 0 1 0 0 1 0 = 18
- 9) 0 1 0 1 0 0 = 20
- 10) 0 1 1 0 0 0 = 24
- 11) 1 0 0 0 0 1 = 33
- 12) 1 0 0 0 1 0 = 34
- 13) 1 0 0 1 0 0 = 36
- 14) 1 0 1 0 0 0 = 40
- 15) 1 1 0 0 0 0 = 48

3(a) 147.35

$$\begin{array}{r}
 2 \overline{)147} \\
 2 \overline{)73} \\
 2 \overline{)36} \\
 2 \overline{)18} \\
 2 \overline{)9} \\
 2 \overline{)4} \\
 2 \overline{)2} \\
 1 \\
 a_7
 \end{array}
 \begin{array}{l}
 a_0 = 1 \\
 a_1 = 1 \\
 a_2 = 0 \\
 a_3 = 0 \\
 a_4 = 1 \\
 a_5 = 0 \\
 a_6 = 0 \\
 a_7
 \end{array}$$

$$\begin{array}{l}
 0.35 \\
 0.7 \quad a_1 = 0 \\
 1.4 \quad a_2 = 1 \\
 0.8 \quad a_3 = 0 \\
 1.6 \quad a_4 = 1 \\
 1.2 \quad a_5 = 1 \\
 0.4 \quad a_6 = 0 \\
 0.8 \quad a_7 = 0
 \end{array}$$

$$(10010011.010110)_2$$

(b)  $(1AB23,01\bar{2})_{12}$

$$= 1 \times 12^4 + A \times 12^3 + B \times 12^2 + 2 \times 12^1 + 3 + \frac{1}{12^2} + \frac{2}{11} \cdot \frac{1}{12^2}$$

$$= 12^4 + 10 \times 12^3 + 11 \times 12^2 + 2 \times 12 + 3 + \frac{13}{12^2 \cdot 11}$$

$$= 39627 + \frac{13}{11 \cdot 12^2}$$

4)(a) (ii)

1  
15  
165  
17115  
1818165

$$15 \times 11^3 = 19965$$

(15)

1  
15  
11025  
11575125  
120150500625

$$15^4 = 50625$$

(ii)

(b)

1  
25  
275  
29125  
21121175

$$25 \times 11^3 = 33275$$

(25)

1  
25  
42025  
860150125  
161606001000625

$$25^4 = 390625$$

$$5.(a) \quad x = \{0, 1, 0, 1, 0, 1, \overline{0, 1}\}$$

$$x = 0.01010101\dots$$

$$2x = 0.101010$$

$$2^2x = 1.010101$$

$$\begin{array}{r} - \quad x = 0.010101 \\ \hline 3x = 1 \end{array} \rightarrow x = \frac{1}{3}$$

$$(b) \quad x = \{1, 1, 0, 1, 0, 1, 0, 1, \overline{0, 1}\}$$

$$x = 0.11\overline{01}$$

$$2x = 1.1\overline{01}$$

$$2^2x = 11.\overline{01}$$

$$4x = 3 + \frac{1}{3} = \frac{9}{3} + \frac{1}{3} = \frac{10}{3}$$

$$x = \frac{10}{12} = \frac{5}{6}$$

6. (a)	0.3	
	0.6	$a_1 = 0$
	1.2	$a_2 = 1$ ←
	0.4	$a_3 = 0$
	0.8	$a_4 = 0$
	1.6	$a_5 = 1$
	1.2	$a_6 = 1$

$$0.3 = \{0, 1, 0, 0, 1\}$$

$$(b) \quad \sqrt{5} \approx 2.236$$

$$\begin{array}{r} 10 \quad 0.236 \\ \quad 0.472 \\ \quad 0.944 \\ \quad 1.888 \\ \quad \hline 1.776 \\ \quad \hline 1.552 \\ \quad 1.104 \\ \quad 0.208 \end{array}$$

$$10 \{0, 0, 1, 1, 1, 1, 0, \dots\}$$

7. (a)  $\frac{1}{7}$

$$\begin{array}{r}
 \phantom{0.}142857 \\
 7 \overline{) 1.000000} \\
 \underline{7} \phantom{000000} \\
 30 \phantom{00000} \\
 \underline{28} \phantom{00000} \\
 20 \phantom{00000} \\
 \underline{14} \phantom{00000} \\
 60 \phantom{00000} \\
 \underline{56} \phantom{00000} \\
 40 \phantom{00000} \\
 \underline{35} \phantom{00000} \\
 50 \phantom{00000} \\
 \underline{49} \phantom{00000} \\
 1
 \end{array}$$

$$\frac{1}{7} = \overline{0.142857}$$

X	$2X - 7X^2$
0.1	0.13
0.13	$0.1428\overline{7}$
$0.1428\overline{7}$	0.14285714

(b)  $\frac{1}{11}$

$$\begin{array}{r}
 \phantom{0.}09 \\
 11 \overline{) 1.00} \\
 \underline{99} \\
 1
 \end{array}$$

$$\frac{1}{11} = \overline{.09}$$

(c)

X	$2X - 11X^2$
0.1	0.09
0.09	0.0909
0.0909	0.090909

8 (a) 0, 1, 1, 2, 3, 5 Fibonacci

(b) 1, 1, 2, 3, 5, 8 "

(c) 1, 2, 3, 5, 8, 13 "

(d) 3, 7, 10, 17, 27, 44

(e) 4, 5, 9, 14, 23, 37