p90 Ex 4A no. 1

1. a) discrete as it's "completed years"

   b) continuous as it's 'length' with no specified units or rounding

   c) discrete, as it's 'counting number of'

   d) discrete, as it's a number (integer) from 1 to 51 inclusive.

Ex 4A no. 2

X = total score from two D6

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

x	2	3	4	5	6	7	8	9	10	11	12
$P(X=x)$	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

b) $E(X) = \sum xP(X=x)$

$$= 2\times\frac{1}{36} + 3\times\frac{2}{36} + \dots + 12\times\frac{1}{36}$$

$$= \frac{1}{36}(2+6+12+\dots+12)$$

$$= \frac{252}{36}$$

$$= 7.$$

(b)'s answer could have been deduced via the symmetry of X's distribution.

Ex4A no. 3

3. X = no heads obtained when tossing coin 3 times.

H H H
H H T
H T H
T H H
H T T
T H T
T T H
T T T

x	0	1	2	3
$P(X=x)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

c) $E(X) = \sum x P(X=x)$

$= 0\times\frac{1}{8} + 1\times\frac{3}{8} + 2\times\frac{3}{8} + 3\times\frac{1}{8}$

$= \frac{12}{8}$

$= \underline{1.5}$

again, this could have been deduced by inspection of symmetry of X's table & probability distribution.

Ex4A no.4

a)

x	1	2	3	4	5
$P(X=x)$	$7c$	$5c$	$4c$	$3c$	c

$\sum P(X=x)=1 \quad \Rightarrow \quad 1 = 7c+5c+4c+3c+c$

$1 = 20c$

$c = \frac{1}{20}.$

b) I expect $E(X)$ to be less than 3 as the values of $P(X=1)$ and $P(X=2)$ are much higher than those for $P(X=4)$ and $P(X=5)$

c) $E(X) = \sum x P(X=x)$

$= 7c + 2\times5c + 3\times4c + 4\times3c + 5\times c$

$= 7c + 10c + 12c + 12c + 5c$

$= 46c$

$= \frac{46}{20}$

$= \frac{23}{10}$

$= 2.3.$

Ex4A no. 5

z	2	3	5	7	11
$P(Z=z)$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{4}$	x	y

we have $E(Z) = 4\frac{2}{3} \Rightarrow \frac{14}{3} = 2 \cdot \frac{1}{6} + 3 \cdot \frac{1}{3} + 5 \cdot \frac{1}{4} + 7x + 11y$ ①

also $\sum P(Z=z) = 1 \Rightarrow 1 = \frac{1}{6} + \frac{1}{3} + \frac{1}{4} + x + y$

using LinSolve on TI-Nspire: $\text{linSolve}\left(\begin{cases} \frac{14}{3} = \frac{2}{6} + \frac{3}{3} + \frac{5}{4} + 7x + 11y \\ 1 = \frac{1}{6} + \frac{1}{3} + \frac{1}{4} + x + y \end{cases}, \{x, y\}\right)$

gives $x = \frac{1}{6}$

$\underline{\underline{y = \frac{1}{12}}}$.