小考參考解答

1.

(a) A stem-and-leaf plot is shown below.

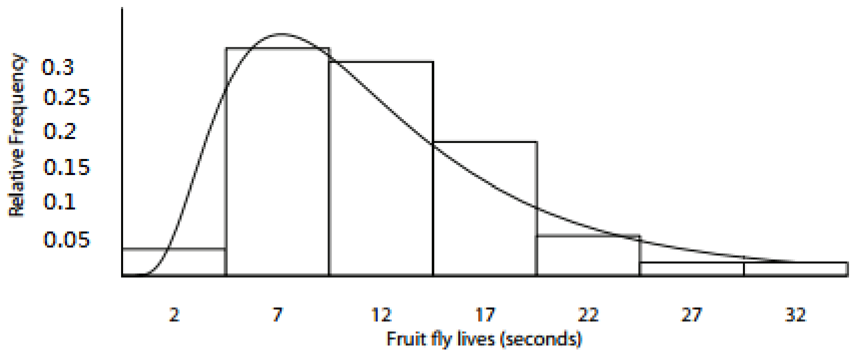
Stem	Leaf	Frequency
0*	34	2
0	56667777777889999	17
1*	0000001223333344	16
1	5566788899	10
2*	034	3
2	7	1
3*	2	1

(b) The relative frequency distribution table is shown next.

Relative Frequency Distribution of Fruit Fly Lives

Class Interval	Class Midpoint	Frequency, f	Relative Frequency
0 – 4	2	2	0.04
5 – 9	7	17	0.34
10 – 14	12	16	0.32
15 – 19	17	10	0.20
20 – 24	22	3	0.06
25 – 29	27	1	0.02
30 – 34	32	1	0.02

(c) A histogram plot is shown next.



2.

(a) $P(A \cap B \cap C) = P(C \mid A \cap B)P(B \mid A)P(A) = (0.20)(0.75)(0.3) = 0.045$.

(b) $P(B' \cap C) = P(A \cap B' \cap C) + P(A' \cap B' \cap C) = P(C \mid A \cap B')P(B' \mid A)P(A) + P(C \mid A' \cap B')P(B' \mid A')P(A') = (0.80)(1 - 0.75)(0.3) + (0.90)(1 - 0.20)(1 - 0.3) = 0.564$.

3.

(a) $g(x) = \int_0^\infty ye^{-y(1+x)}\, dy = -\frac{1}{1+x} ye^{-y(1+x)}\Big|_0^\infty + \frac{1}{1+x}\int_0^\infty e^{-y(1+x)}\, dy$

$= -\frac{1}{(1+x)^2}\, e^{-y(1+x)}\Big|_0^\infty$

$= \frac{1}{(1+x)^2}$, for $x > 0$.

$h(y) = ye^{-y}\int_0^\infty e^{-yx}\, dx = -e^{-y}\, e^{-yx}|_0^\infty = e^{-y}$, for $y > 0$.

(b) $P(X \geq 2, Y \geq 2) = \int_2^\infty \int_2^\infty ye^{-y(1+x)}\, dx\, dy = -\int_2^\infty e^{-y}\, e^{-yx}|_2^\infty\, dy = \int_2^\infty e^{-3y} dy$

$= -\frac{1}{3}e^{-3y}\Big|_2^\infty = \frac{1}{3e^6}$.

4.

Assigning wrights of $3w$ and w for a head and tail, respectively. We obtain $P(H) = 3/4$ and $P(T) = 1/4$. The sample space for the experiment is $S = \{HH, HT, TH, TT\}$. Now if X represents the number of tails that occur in two tosses of the coin, we have

$$P(X = 0) = P(HH) = (3/4)(3/4) = 9/16,$$
$$P(X = 1) = P(HT) + P(TH) = (2)(3/4)(1/4) = 3/8,$$
$$P(X = 2) = P(TT) = (1/4)(1/4) = 1/16.$$

The probability distribution for X is then

x	0	1	2
$f(x)$	9/16	3/8	1/16

from which we get $\mu = E(X) = (0)(9/16) + (1)(3/8) + (2)(1/16) = 1/2$.