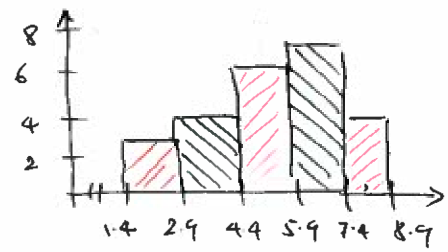
Biometry - HW 1 - Solutions

① If you measure with precision 0.1 kg you have $(9-1)/0.1 = 80$ unit steps between the smallest and the largest measurements.

② $e_1 = \frac{1.45-1.4}{1.4} = 0.0357 = 3.57\%$; $e_2 = \frac{8.75-8.7}{8.7} = 0.0057 = 0.57\%$

③ Class width $= \frac{8.7-1.4}{5} = 1.46 \longrightarrow 1.5$

Class interval	Frequency
1.4 - 2.8	3
2.9 - 4.3	4
4.4 - 5.8	6
5.9 - 7.3	7
7.4 - 8.9	4



④

x	$(x-\bar{x})^2$
5.2	6.5025
7.6	0.0225
5.5	5.0625
6.8	0.9025
5.9	3.4225
8.6	0.7225
10.0	5.0625
12.4	21.6225
$\Sigma x = 62$	43.32

$\bar{x} = \frac{\Sigma x}{n} = \frac{62}{8} = 7.75$ years

$s^2 = \frac{\Sigma(x-\bar{x})^2}{n-1} = \frac{43.32}{7} = 6.189$

$s = 2.49$ years

$CV = \frac{2.49}{7.75} = 0.321 = 32.1\%$

⑤ $\bar{x} = \frac{52 \cdot 0 + 32 \cdot 1 + 12 \cdot 2 + 20 \cdot 3 + 4 \cdot 4}{52+32+12+20+4} = 1.1$ ticks per deer.

⑥ Av. growth rate $= \sqrt[7]{(1.03)(1.02)(1.08)(1.01)(1)(0.97)(1.04)} = 1.021 \rightarrow 2.1\%$

⑦

	P	NP	
I	24	6	30
S	10	12	22
D	8	20	28
	42	38	80

a) $p(P) = \frac{42}{80} = 0.525$, 52.5% chance the plant will be protected

b) $p(I) = \frac{30}{80} = 0.375$, 37.5% probability the plant is in an area of increasing population

c) $p(D^c) = \frac{52}{80} = 0.65$, 0.65 probability the plant is in area of nondecreasing population

d) $p(S \cap P) = \frac{10}{80} = 0.125$, 0.125 probability the plant is protected and in area of stable population.

e) $P(D \cap NP) = \frac{20}{80} = 0.25$, 0.25 probability the plant is not protected and in an area of decreasing population.

f) $p(I \cup P) = \frac{30}{80} + \frac{42}{80} - \frac{24}{80} = 0.6$; 0.6 probability the plant is protected or in an area of increasing population.

g) $p(I|P) = \frac{24}{42} = 0.571$; 0.571 probability the plant is in an area of increasing population if it is protected.

h) $p(P|I) = \frac{24}{30} = 0.8$; 0.8 probability the plant is protected if it is in an area of increasing population.

i) $p(D^c|P) = \frac{34}{42} = 0.81$; 0.81 probability the plant is in area of nondecreasing population if protected.

$$\left.\begin{array}{ll} p(I) = 0.375, & p(I|P) = 0.571 \\ p(S) = 0.275, & p(S|P) = 0.238 \\ p(D) = 0.35 & p(D|P) = 0.19 \end{array}\right\}$$

Protection status and population status are dependent.

(8) $p(A) = 0.03$; $p(S|A) = 0.45$; $p(S|A^c) = 0.8$

$$p(A|S) = \frac{p(S|A)\,p(A)}{p(S|A)\,p(A) + p(S|A^c)\,p(A^c)} = \frac{(0.45)(0.03)}{(0.45)(0.03) + (0.8)(0.97)}$$

$p(A|S) = 0.017$

Solution via a table.

	A	A^c	
S	14	776	790
S^c	16	94	110
	30	970	1000

$p(A|S) = \frac{14}{790} = 0.017$