

Chapter 1: Solutions to Problems 1-7

1. CGC Arg → CGG Arg 0/3
 CGA Arg
 CGU Arg
- AGG Arg → GGG Gly 2/3
 CGG Arg
 UGG Trp
- UUG Leu → UUA Leu 2/3
 UUU Phe
 UUC Phe

2.
$$R = \frac{N_{t+1}}{N_t}$$

$$R = \frac{90}{60} = 1.5$$

$$N_t = R^t (N_0)$$

$$N_3 = (1.5^3)(60) = 202.5$$

3.
$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

$$\bar{x} = \frac{1}{69} [25(1) + 27(12) + 28(16) + 29(27) + 30(9) + 32(4)] = \frac{1978}{69} = 28.7$$

$$V_x = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

$$V_x = \frac{1}{68} [(25-28.7)^2(1) + (27-28.7)^2(12) + (28-28.7)^2(16) + (29-28.7)^2(27) + (30-28.7)^2(9) + (32-28.7)^2(4)]$$

$$V_x = \frac{11733}{68} = 1.73$$

$$sd = \sqrt{V_x} = (V_x)^{\frac{1}{2}} \quad sd = \sqrt{1.725} = 1.31$$

$$CV = \frac{100(V_x)^{\frac{1}{2}}}{\bar{x}} \quad CV = \frac{100(1.725)^{\frac{1}{2}}}{28.67} = 4.58$$

$$se = \left(\frac{V_x}{n} \right)^{\frac{1}{2}} \quad se = \left(\frac{1.725}{69} \right)^{\frac{1}{2}} = 0.16$$

$$4. \quad \bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

$$\bar{x} = \frac{1}{5} [105 + 17 + 266 + 183 + 145] = \frac{716}{5} = 143.2$$

$$\bar{x}_g = \left(\prod_{i=1}^N x_i \right)^{\frac{1}{N}}$$

$$\bar{x}_g = (105 \times 17 \times 266 \times 183 \times 145)^{0.2} = 104.7$$

$$\bar{x}_h = \frac{N}{\sum_{i=1}^N \frac{1}{x_i}}$$

$$\bar{x}_h = \frac{5}{\frac{1}{105} + \frac{1}{17} + \frac{1}{266} + \frac{1}{183} + \frac{1}{145}} = 59.2$$

$$5. \quad \Pr(\ominus) = 1 - \Pr(\oslash) = 1 - 0.52 = 0.48$$

$$\Pr(3 \text{ consecutive } \ominus) = (0.48)(0.48)(0.48) = 0.111$$

$$\Pr(i) = \frac{N!}{i!j!} p^i q^j$$

$$\Pr(2\oslash \text{ and } 2\ominus) = \frac{4!}{2!2!} (0.52^2)(0.48^2) = 0.374$$

$$6. \quad \Pr(i) = \frac{e^{-\mu} \mu^i}{i!} \text{ where } \mu = Np$$

$$\Pr(0) = \frac{e^{-500(0.001)} (500(0.001))^0}{0!} = 0.607$$

$$\Pr(2) = \frac{e^{-500(0.001)} (500(0.001))^2}{2!} = 0.076$$

7.

$$Y = \begin{vmatrix} \sum_{i=1}^3 x_{1i} y_i \\ \sum_{i=1}^3 x_{2i} y_i \\ \sum_{i=1}^3 x_{3i} y_i \end{vmatrix}$$

$$X = \begin{vmatrix} 1.0 & 0.25 & 0.0 \\ 0.0 & 0.5 & 0.0 \\ 0.0 & 0.25 & 1.0 \end{vmatrix} \quad Y = \begin{vmatrix} 0.0 \\ 1.0 \\ 0.0 \end{vmatrix}$$

$$Y' = \begin{vmatrix} (1.0)(0.0) + (0.25)(1.0) + (0.0)(0.0) \\ (0.0)(0.0) + (0.50)(1.0) + (0.0)(0.0) \\ (0.0)(0.0) + (0.25)(1.0) + (1.0)(0.0) \end{vmatrix} = \begin{vmatrix} 0.25 \\ 0.50 \\ 0.25 \end{vmatrix}$$

$$X = \begin{vmatrix} 1.0 & 0.25 & 0.0 \\ 0.0 & 0.5 & 0.0 \\ 0.0 & 0.25 & 1.0 \end{vmatrix} \quad Y' = \begin{vmatrix} 0.25 \\ 0.50 \\ 0.25 \end{vmatrix}$$

$$Y'' = \begin{vmatrix} (1.0)(0.25) + (0.25)(0.50) + (0.0)(0.25) \\ (0.0)(0.25) + (0.50)(0.50) + (0.0)(0.25) \\ (0.0)(0.25) + (0.25)(0.50) + (1.0)(0.25) \end{vmatrix} = \begin{vmatrix} 0.375 \\ 0.250 \\ 0.375 \end{vmatrix}$$