

$$1. \begin{bmatrix} 1/3 & 1/3 & 0 & 1/3 \\ 1/3 & 1/3 & 1/3 & 0 \\ 0 & 2/5 & 3/5 & 0 \\ 2/3 & 1/3 & 0 & 0 \end{bmatrix} \begin{bmatrix} St \\ Ba \\ Ma \\ Bl \end{bmatrix} = \begin{bmatrix} 19/3 \\ 19/3 \\ 34/5 \\ 17/3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 0 & 1 & | & 19 \\ 1 & 1 & 1 & 0 & | & 19 \\ 0 & 2 & 3 & 0 & | & 34 \\ 2 & 1 & 0 & 0 & | & 17 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 0 & 1 & | & 19 \\ 0 & 0 & 1 & -1 & | & 0 \\ 0 & 2 & 3 & 0 & | & 34 \\ 0 & -1 & 0 & -2 & | & -21 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 0 & 1 & | & 19 \\ 0 & 1 & 0 & 2 & | & 21 \\ 0 & 0 & 1 & -1 & | & 0 \\ 0 & 2 & 3 & 0 & | & 34 \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 0 & 0 & -1 & | & -21 \\ 0 & 1 & 0 & 2 & | & 21 \\ 0 & 0 & 1 & -1 & | & 0 \\ 0 & 0 & 3 & -4 & | & -8 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 0 & -1 & | & -2 \\ 0 & 1 & 0 & 2 & | & 21 \\ 0 & 0 & 1 & -1 & | & 0 \\ 0 & 0 & 0 & -1 & | & -8 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 0 & 0 & | & 6 \\ 0 & 1 & 0 & 0 & | & 5 \\ 0 & 0 & 1 & 0 & | & 8 \\ 0 & 0 & 0 & 1 & | & 8 \end{bmatrix}$$

strawberries = 6

bananas = 5

mangos = 8

blueberries = 8

- b) 0 strawberries the score would be 8
 0 bananas
 1/2 mangos
 1/2 blueberries

$$2. a) p = 1 - 0.95 e^{(-a \ln age + b \ln total \text{ chol} + c \ln HDL \text{ chol} + d \ln SBP - 25.66)}$$

$$p = 1 - 0.95 a \cdot age \times b \cdot total \text{ chol} \times c \cdot HDL \text{ chol} \times d \cdot SBP$$

$$0.95 e^{(R - 25.66)} = 1 - p$$

$$(R - 25.66) \ln 0.95 = \ln(1 - p)$$

$$\ln 0.95 e^{(R - 25.66)} = \ln(1 - p)$$

$$e^{(R - 25.66)} \ln 0.95 = \ln(1 - p)$$

$$R \ln 0.95 = 25.66 \ln 0.95 + \ln(1 - p)$$

$$e^{(R - 25.66)} = \ln(1 - p) / \ln 0.95$$

$$R - 25.66 = \ln \left(\frac{\ln(1 - p)}{\ln 0.95} \right)$$

$$R = \ln \left(\frac{\ln(1 - p)}{\ln 0.95} \right) + 25.66$$

$$R = 26.5278 = a \cdot \ln(\text{age}) + b \cdot \ln(\text{total chol}) + c \cdot \ln(\text{HDL chol}) + d \cdot \ln(\text{SBP})$$

$$26.4883 = a \cdot \ln(\text{age}) + b \cdot \ln(\text{total chol}) + c \cdot \ln(\text{HDL chol}) + d \cdot \ln(\text{SBP})$$

$$26.3147 = a \cdot \ln(\text{age}) + b \cdot \ln(\text{total chol}) + c \cdot \ln(\text{HDL chol}) + d \cdot \ln(\text{SBP})$$

$$24.0791 = a \cdot \ln(\text{age}) + b \cdot \ln(\text{total chol}) + c \cdot \ln(\text{HDL chol}) + d \cdot \ln(\text{SBP})$$

$$26.5278 = a \ln 66 + b \ln 198 + c \ln 55 + d \ln 132$$

$$26.4883 = a \ln 61 + b \ln 150 + c \ln 47 + d \ln 124$$

$$26.3147 = a \ln 60 + b \ln 180 + c \ln 50 + d \ln 120$$

$$24.0791 = a \ln 23 + b \ln 132 + c \ln 45 + d \ln 132$$

$$b) \quad a = -3.3666$$

$$b = 18.1398$$

$$c = -6.7643$$

$$d = -5.7730$$

$$3. a) \quad \vec{m}_1 = \cos(45^\circ) \vec{a} + \cos(30^\circ) \vec{b} = \frac{\sqrt{2}}{2} \vec{a} + \frac{\sqrt{3}}{2} \vec{b}$$

$$\vec{m}_2 = \sin(45^\circ) \vec{a} + \sin(-30^\circ) \vec{b} = \frac{\sqrt{2}}{2} \vec{a} - \frac{1}{2} \vec{b}$$

$$b) \quad \vec{m}_1 + \sqrt{3} \vec{m}_2 = \frac{\sqrt{2}}{2} \vec{a} + \frac{\sqrt{6}}{2} \vec{a} + \frac{\sqrt{3}}{2} \vec{b} - \frac{\sqrt{3}}{2} \vec{b}$$

$$\frac{(\sqrt{2} + \sqrt{6})}{2} \vec{a} = \vec{m}_1 + \sqrt{3} \vec{m}_2$$

$$\vec{a} = \frac{2}{\sqrt{2} + \sqrt{6}} \vec{m}_1 + \frac{2\sqrt{3}}{\sqrt{2} + \sqrt{6}} \vec{m}_2$$

$$u = \frac{2}{\sqrt{2} + \sqrt{6}} \quad v = \frac{2\sqrt{3}}{\sqrt{2} + \sqrt{6}}$$

c) All human beings are born equal in dignity and rights

4. No one is