2.2 Denote the events:

$$\begin{aligned} M &= \{ \text{ problems with a motherboard } \} \\ H &= \{ \text{ problems with a hard drive } \} \end{aligned}$$

We have:

$$\boldsymbol{P}\{M\} = 0.4,\ \boldsymbol{P}\{H\} = 0.3, \quad \text{and} \quad \boldsymbol{P}\{M \cap H\} = 0.15.$$

Hence,

$$\boldsymbol{P}\{M \cup H\} = \boldsymbol{P}\{M\} + \boldsymbol{P}\{H\} - \boldsymbol{P}\{M \cap H\} = 0.4 + 0.3 - 0.15 = 0.55,$$

and

$$\boldsymbol{P}\{\text{fully functioning MB and HD}\} = 1 - \boldsymbol{P}\{M \cup H\} = \boxed{0.45}$$

2.4 Denote the events,

$$C = \{ \text{ knows C/C++ } \}, \quad F = \{ \text{ knows Fortran } \}.$$

Then

(a) $\boldsymbol{P}\{\bar{F}\} = 1 - \boldsymbol{P}\{F\} = 1 - 0.6 = \boxed{0.4}$

(b) $$\begin{aligned} \boldsymbol{P}\{\bar{F} \cap \bar{C}\} &= 1 - \boldsymbol{P}\{F \cup C\} = 1 - (\boldsymbol{P}\{F\} + \boldsymbol{P}\{C\} - \boldsymbol{P}\{F \cap C\}) \\ &= 1 - (0.7 + 0.6 - 0.5) = 1 - 0.8 = \boxed{0.2} \end{aligned}$$

(c) $\boldsymbol{P}\{C \backslash F\} = \boldsymbol{P}\{C\} - \boldsymbol{P}\{F \cap C\} = 0.7 - 0.5 = \boxed{0.2}$

(d) $\boldsymbol{P}\{F \backslash C\} = \boldsymbol{P}\{F\} - \boldsymbol{P}\{F \cap C\} = 0.6 - 0.5 = \boxed{0.1}$

(e) $\boldsymbol{P}\{C \mid F\} = \dfrac{\boldsymbol{P}\{C \cap F\}}{\boldsymbol{P}\{F\}} = \dfrac{0.5}{0.6} = \boxed{0.8333}$

(f) $\boldsymbol{P}\{F \mid C\} = \dfrac{\boldsymbol{P}\{C \cap F\}}{\boldsymbol{P}\{C\}} = \dfrac{0.5}{0.7} = \boxed{0.7143}$

2.6 Let $A = \{\text{arrive on time}\}$, $W = \{\text{good weather}\}$. We have

$$\boldsymbol{P}\{A \mid W\} = 0.8,\ \boldsymbol{P}\{A \mid \bar{W}\} = 0.3,\ \boldsymbol{P}\{W\} = 0.6$$

By the Law of Total Probability,

$$\begin{aligned} \boldsymbol{P}\{A\} &= \boldsymbol{P}\{A \mid W\}\boldsymbol{P}\{W\} + \boldsymbol{P}\{A \mid \bar{W}\}\boldsymbol{P}\{\bar{W}\} \\ &= (0.8)(0.6) + (0.3)(0.4) = \boxed{0.60} \end{aligned}$$

2.8 Let $A_1 = \{\text{1st device fails}\}$, $A_2 = \{\text{2nd device fails}\}$, $A_3 = \{\text{3rd device fails}\}$.

$$\begin{aligned}
\boldsymbol{P}\{\text{ on time }\} &= \boldsymbol{P}\{\text{ all function }\} \\
&= \boldsymbol{P}\left\{\overline{A}_1 \cap \overline{A}_2 \cap \overline{A}_3\right\} \\
&= \boldsymbol{P}\left\{\overline{A}_1\right\} \boldsymbol{P}\left\{\overline{A}_2\right\} \boldsymbol{P}\left\{\overline{A}_3\right\} && \text{(independence)} \\
&= (1-0.01)(1-0.02)(1-0.02) && \text{(complement rule)} \\
&= \boxed{0.9508}
\end{aligned}$$

2.9 $\boldsymbol{P}\{\text{at least one fails}\} = 1 - \boldsymbol{P}\{\text{all work}\} = 1 - (.96)(.95)(.90) = \boxed{0.1792}$.

2.10
$$\begin{aligned}
\boldsymbol{P}\{A \cup B \cup C\} &= 1 - \boldsymbol{P}\{\bar{A} \cap \bar{B} \cap \bar{C}\} = 1 - \boldsymbol{P}\{\bar{A}\}\boldsymbol{P}\{\bar{B}\}\boldsymbol{P}\{\bar{C}\} \\
&= 1 - (1-0.4)(1-0.5)(1-0.2) = \boxed{0.76}
\end{aligned}$$

2.15 Let $A = \{\text{Error in the 1st block}\}$ and $B = \{\text{Error in the 2nd block}\}$. Then $P\{A\} = 0.2$, $P\{B\} = 0.3$, and $P\{A \cap B\} = 0.06$ by independence;
$P\{\text{ error in program }\} = P\{A \cup B\} = 0.2 + 0.3 - 0.06 = 0.44$.

Then, by the definition of conditional probability,

$$P\{A \cap B \mid A \cup B\} = \frac{P\{A \cap B\}}{P\{A \cup B\}} = \frac{0.06}{0.44} = \boxed{0.1364}$$

Or, by the Bayes Rule,

$$\begin{aligned}
P\{A \cap B \mid A \cup B\} &= \frac{P\{A \cup B \mid A \cap B\} P\{A \cap B\}}{P\{A \cup B\}} \\
&= \frac{(1)(0.06)}{0.44} = \boxed{0.1364}
\end{aligned}$$

2.17 Let $D = \{\text{defective part}\}$. We are given:

$$\begin{array}{l|l}
P\{X\} = 0.24 & P\{D|X\} = 0.05 \\
P\{Y\} = 0.36 & P\{D|Y\} = 0.10 \\
P\{Z\} = 0.40 & P\{D|Z\} = 0.06
\end{array}$$

Combine the Bayes Rule and the Law of Total Probability.

$$\begin{aligned}
\boldsymbol{P}\{Z \mid D\} &= \frac{\boldsymbol{P}\{D|Z\} P\{Z\}}{P\{D|X\}P\{X\} + P\{D|Y\}P\{Y\} + P\{D|Z\}P\{Z\}} \\
&= \frac{(0.06)(0.40)}{(0.05)(0.24) + (0.10)(0.36) + (0.06)(0.40)} \\
&= \boxed{1/3 \text{ or } 0.3333}
\end{aligned}$$

2.19 Let $D = \{\text{defective part}\}$ and $I = \{\text{inspected electronically}\}$. By the Bayes Rule,

$$\begin{aligned} \boldsymbol{P}\{I|D\} &= \frac{\boldsymbol{P}\{D|I\}\,\boldsymbol{P}\{I\}}{\boldsymbol{P}\{D|I\}\,\boldsymbol{P}\{I\} + \boldsymbol{P}\{D|\bar{I}\}\,\boldsymbol{P}\{\bar{I}\}} \\ &= \frac{(1-0.95)(0.20)}{(1-0.95)(0.20)+(1-0.7)(1-0.20)} = \boxed{0.0400} \end{aligned}$$