3.)

D: aircraft is discovered ; E: aircraft has an emergency locator.

$P(E|D) = 0.60$; $P(\bar{E}|\bar{D}) = 0.90$, $P(D) = 0.70$

a) $P(\bar{D}|E) = \dfrac{P(\bar{D} \cap E)}{P(E)} = \dfrac{P(E|\bar{D}) \cdot P(\bar{D})}{P(E)}$

Need to find $P(\bar{D} \cap E)$ and $P(E)$

$P(E) = P(E \cap D) + P(E \cap \bar{D})$

Note that $P(E|\bar{D}) + P(\bar{E}|\bar{D}) = \dfrac{P(E \cap \bar{D}) + P(\bar{E} \cap \bar{D})}{P(\bar{D})} = \dfrac{P(\bar{D})}{P(\bar{D})} = 1$

$\therefore P(E|\bar{D}) = 1 - P(\bar{E}|\bar{D}) = 1 - 0.90 = 0.10 = \dfrac{P(E \cap \bar{D})}{P(\bar{D})}$

$\Rightarrow P(E \cap \bar{D}) = 0.10 \cdot P(\bar{D}) = 0.10(1 - 0.70) = 0.10 \cdot 0.30 = 0.03$

then $P(E) = P(E|D) \cdot P(D) + P(E|\bar{D}) \cdot P(\bar{D}) = (0.6)(0.70) + (0.10)(0.3) = 0.45$

$\Rightarrow P(\bar{D}|E) = \dfrac{0.03}{0.45} = 0.0667$ or 6.7%

3.b) $P(D \mid \bar{E}) = ?$

$$P(D \mid \bar{E}) + P(\bar{D} \mid \bar{E}) = \frac{P(D \cap \bar{E}) + P(\bar{D} \cap \bar{E})}{P(\bar{E})} = \frac{P(\bar{E})}{P(\bar{E})} = 1$$

$$\Rightarrow P(D \mid \bar{E}) = 1 - P(\bar{D} \mid \bar{E}) = 1 - \left(\frac{P(\bar{E} \mid \bar{D}) \cdot P(\bar{D})}{P(\bar{E})} \right)$$

$$= 1 - \left(\frac{(0.90) \cdot (0.30)}{1 - 0.45} \right) = 1 - 0.49 = 0.51$$

$\therefore$ P(being discovered | not emergency locator) = 0.51