1. $P(A|G) = \frac{P(A)P(G|A)}{P(G)}$

$= \frac{\frac{1}{2} \times \frac{3}{4}}{\frac{5}{8}}$

$= \frac{3}{5}$

2. (a) A and B are blocked, both arcs on path enter C and C is not given. Case 3. A and B are independent

(b) A and B are unblocked $A \to C \leftarrow B$, D is given $Par(D)=C$ they are not independent

(c) A and E are independent, Case 3, they are blocked

(d) A and E are unblocked. since C is given then $A \to C \leftarrow B \to E$ is unblocked, they are not independent

(e) A and E are blocked, since B is given, then $A \to C \leftarrow B \to E$ is blocked, $A \to C \to D \leftarrow E$ is blocked they're independe

(f) A and E are blocked since B, C is given, then $A \to C \leftarrow B \to E$ is blocked, $A \to C \to D \leftarrow E$ is blocked.

(g) A and E are unblocked $A \to C \to D \leftarrow E$, D is given they are not independent

(h) A and E are unblocked, $A \to C \leftarrow B \to E$ is unblocked by Case 3. $A \to C \to D \leftarrow E$ is blocked they aren't independent

(i) F and H are unblocked, $F \to C \to D \to H$
they are not independent

(j) J and E are blocked, $E \to D \to G \leftarrow J$ is case 3
they are independent

(k) J and E are unblocked, since G is given, by case 3
$E \to D \to G \leftarrow J$ is unblocked. they are not independent

(l) J and E are blocked, $E \to D \to G \leftarrow J$ is case 3.
they are independent

(m) G and A are unblocked $A \to C \to D \to G$
they are not independent

(n) G and A are blocked. Since C is Given, and all paths
from A to G have to pass C they are independent

(o) G and A are blocked. since C and D is Given and
all paths from A to G have to pass C and D they
are not independent

3(1)

$$\begin{tikzcd} NA \arrow[r] & NDG \arrow[dr] & FM \arrow[l] \arrow[d] \\ FB & FS \arrow[l] \arrow[r] & FH \end{tikzcd}$$

$P(NA) = 0.3$

$P(FS) = 0.05$

$P(FM) = 0.035$

NA	FM	P(NDG)
T	T	0.8
F	F	0
T	F	0.5
F	T	0.4

FS	FB
T	0.6
F	0.1

NDG	FM	FS	P(FH)
T	T	T	0.99
T	T	F	0.65
T	F	T	0.75
T	F	F	0.2
F	T	T	0.9
F	F	T	0.5
F	T	F	0.4
F	F	F	0

(2) $Pr(FH) = P(FH \mid FS, FM, NDG) \cdot P(FS, FM, NDG)$

$$= P(FH \mid FS, FM, NDG) P(FS) P(FM)$$

$$P(NDG \mid FM, NA) P(NA)$$

$$= 10.8\%$$

(3) $P(FS \mid FH, FM) = \alpha \times P(FS, FH, FM)$

$$= \alpha \times P(FS) P(FM) P(FH \mid FS, FM)$$

$$= \alpha \times 0.05 \times 0.035 \times 1.89$$

$$= \alpha \times 0.0033075$$

$P(\neg FS \mid FH, FM) = \alpha P(\neg FS, FH, FM)$

$$= \alpha P(\neg FS) P(FM) P(FH \mid FM, \neg FS)$$

$$= \alpha \times 0.95 \times 0.035 \times 1.05$$

$$= \alpha \times 0.0349125$$

$$P(FS) = \frac{0.0033075}{0.0349125 + 0.0033075}$$

$$= 8.5\%$$

(4) $P(FS | FH, FM, FB)$

$= \alpha P(FS, FH, FM, FB)$

$= \alpha P(FS) P(FM) P(FH | FS, FM) P(FB | FS)$

$= \alpha 0.05 \times 0.035 \times 1.89 \times 0.6$

$= 1.9845 \times 10^{-3} \times \alpha$

$P(\neg FS | FH, FM, FB)$

$= \alpha P(\neg FS, FH, FM, FB)$

$= \alpha P(\neg FS) P(FM) P(FH | \neg FS, FM) P(FB | \neg FS)$

$= \alpha 0.95 \times 0.035 \times 1.05 \times 0.1$

$= 3.49125 \times 10^{-3} \alpha$

$$P(FS) = \frac{1.9845 \times 10^{-3}}{3.49125 \times 10^{-3} + 1.9845 \times 10^{-3}} = 36\%$$

(5) $P(FS | FH, FM, FB, NA)$

$= \alpha P(FS) P(FM) P(NA) P(FH | FS, FM, NDG) P(FB | FS)$

$= 5.1975 \times 10^{-4} \alpha$

$P(\neg FS | FH, FM, FB, NA) = 1.080625 \times 10^{-3} \alpha$

$P(FS) = 33\%$