step1

$$S_o(8+, 6-)$$

$$S = -\frac{8}{14} \log_2\left(\frac{8}{14}\right) - \frac{6}{14} \log_2\left(\frac{6}{14}\right) = 0.985$$

~~S(E1)~~ (4+, attribute "early registration : E1"

$$S(E1-0) \longrightarrow (4+, 4-)$$
$$S(E1-0) = 1$$

$$S(E1-1) \longrightarrow (4+, 2-)$$
$$S(E1-1) = -\frac{4}{6} \log_2\left(\frac{4}{6}\right) - \frac{2}{6} \log_2\left(\frac{2}{6}\right) = 0.918$$

$$\cdot \ IG(E1) = 0.985 - \frac{8}{14}(1) - \frac{6}{14}(0.918) = \boxed{0.0201}$$

attribute "finished hw : F1"

$$S(F1-0) \longrightarrow (3+, 4-)$$
$$S(F1-0) = 0.985$$

$$S(F1-1) \longrightarrow (5+, 2-)$$
$$S(F1-1) = 0.363$$

$$IG(F1) = \frac{7}{14} \ 0.985 - \frac{7}{14}(0.985) - \frac{7}{14}(0.863) = \boxed{0.061}$$

attribute "senior : S1"

$$S(S1-0) \longrightarrow (3+, 3-)$$
$$S(S1-0) = 1$$

$$S(S1-1) \longrightarrow (5+, 3-)$$
$$S(S1-1) = 0.954$$

$$IG(S1) = 0.985 - \frac{6}{14}(1) - \frac{8}{14}(0.954) = \boxed{0.0113}$$

attribute "likes coffee : L1"

$$S(L1-0) \longrightarrow (5+, 5-)$$
$$S(L1-0) = 1$$

$$S(L1-1) \longrightarrow (3+, 1-)$$
$$S(L1-1) = 0.811$$

$$IG(L1) = 0.985 - \frac{10}{14}(1) - \frac{4}{14}(0.811) = \boxed{0.039}$$

attribute "liked hw : H1"

$$S(H1-0) \longrightarrow (3+, 2-)$$
$$S(H1-0) = 0.971$$

$$S(H1-1) \longrightarrow (5+, 4-)$$
$$S(H1-1) = 0.991$$

$$IG(H1) = 0.985 - \frac{5}{14}(0.971) - \frac{9}{14}(0.991) = \boxed{0.00114}$$

$\longrightarrow$ highest IG @ attribute "finished hw : F1"

step 2
F1 – 0

$S \longrightarrow (3+, 4-)$ $n = 7$

$S = 0.985$

attribute "early registration: E2"

$S(E2-0) \longrightarrow (2+, 2-)$ $S(E2-1) \longrightarrow (1+, 2-)$

$S(E2-0) = 1$ $S(E2-1) = 0.918$

$IG(E2) = 0.985 - \frac{4}{7}(1) - \frac{3}{7}(0.918) = \boxed{0.0201}$

attribute "senior : S2"

$S(S2-0) \longrightarrow (1+, 3-)$ $S(S2-1) \longrightarrow (2+, 1-)$

$S(S2-0) = 0.811$ $S(S2-1) = 0.918$

$IG(S2) = 0.985 - \frac{4}{7}(0.811) - \frac{3}{7}(0.918) = \boxed{0.128}$

attribute "likes coffee: L2"

$S(L2-0) \longrightarrow (1+, 4-)$ $S(L2-1) \longrightarrow (2+, 0-)$

$S(L2-0) = 0.722$ $S(L2-1) = 0$

$IG(L2) = 0.985 - \frac{5}{7}(0.722) - \frac{2}{7}(0) = \boxed{0.469}$

attribute "liked hw: H2"

$S(H2-0) \longrightarrow (1+, 2-)$ $S(H2-1) \longrightarrow (2+, 2-)$

$S(H2-0) = 0.918$ $S(H2-1) = 1$

$IG(H2) = 0.985 - \frac{3}{7}(0.918) - \frac{4}{7}(1) = \boxed{0.0201}$

$\longrightarrow$ highest IG @ L2 : likes coffee

step 3
L2 – 0

$n = 5$ $S \longrightarrow (1+, 4-)$ $S = 0.722$

$IG(E_3) = 0.722 - \frac{3}{5}(0.918) - \frac{2}{5}(0) = 0.172$

$IG(S_3) = 0.722 - \frac{3}{5}(0) - \frac{2}{5}(1) = 0.322$

$IG(H3) = 0.722 - \frac{2}{5}(0) - \frac{3}{5}(0.918) = 0.172$

$\longrightarrow$ highest IG @ S3 : senior

step 4 $\quad n=2 \qquad S \to (1+, 1-) \qquad\qquad S=1$
$S3 = 1$

$\qquad IG(E_4) = 1 - \frac{2}{2}(1) - \frac{0}{2} = 0.$

$\qquad IG(H_4) = 1 - \frac{1}{2}(0) - \frac{1}{2}(0) = 1$

$\qquad \longrightarrow$ highest IG @ H_4 : liked her

step 5 $\quad n=7 \qquad S \to (5+, 2-) \qquad\qquad S= 0.863$
$F1 = 1$

● $\qquad IG(E5) = 0.863 - \frac{4}{7}(1) - \frac{3}{7}(0) = 0.292$

$\qquad IG(S5) = 0.863 - \frac{2}{7}(0) - \frac{5}{7}(0.971) = 0.169$

$\qquad IG(L5) = 0.863 - \frac{5}{7}(0.722) - \frac{2}{7}(1) = 0.062$

$\qquad IG(H5) = 0.863 - \frac{2}{7}(0) - \frac{5}{7}(0.971) = 0.169$

$\qquad \longrightarrow$ highest IG @ E5 ; early registration

step 6 $\quad n=4 \qquad S \to (2+, 2-) \qquad S=1$
$E5 = 0$

● $\qquad IG(S6) = 1 - \frac{1}{4}(0) - \frac{3}{4}(0.918) = 0.3115$

$\qquad IG(L6) = 1 - \frac{2}{4}(1) - \frac{2}{4}(1) = 0$

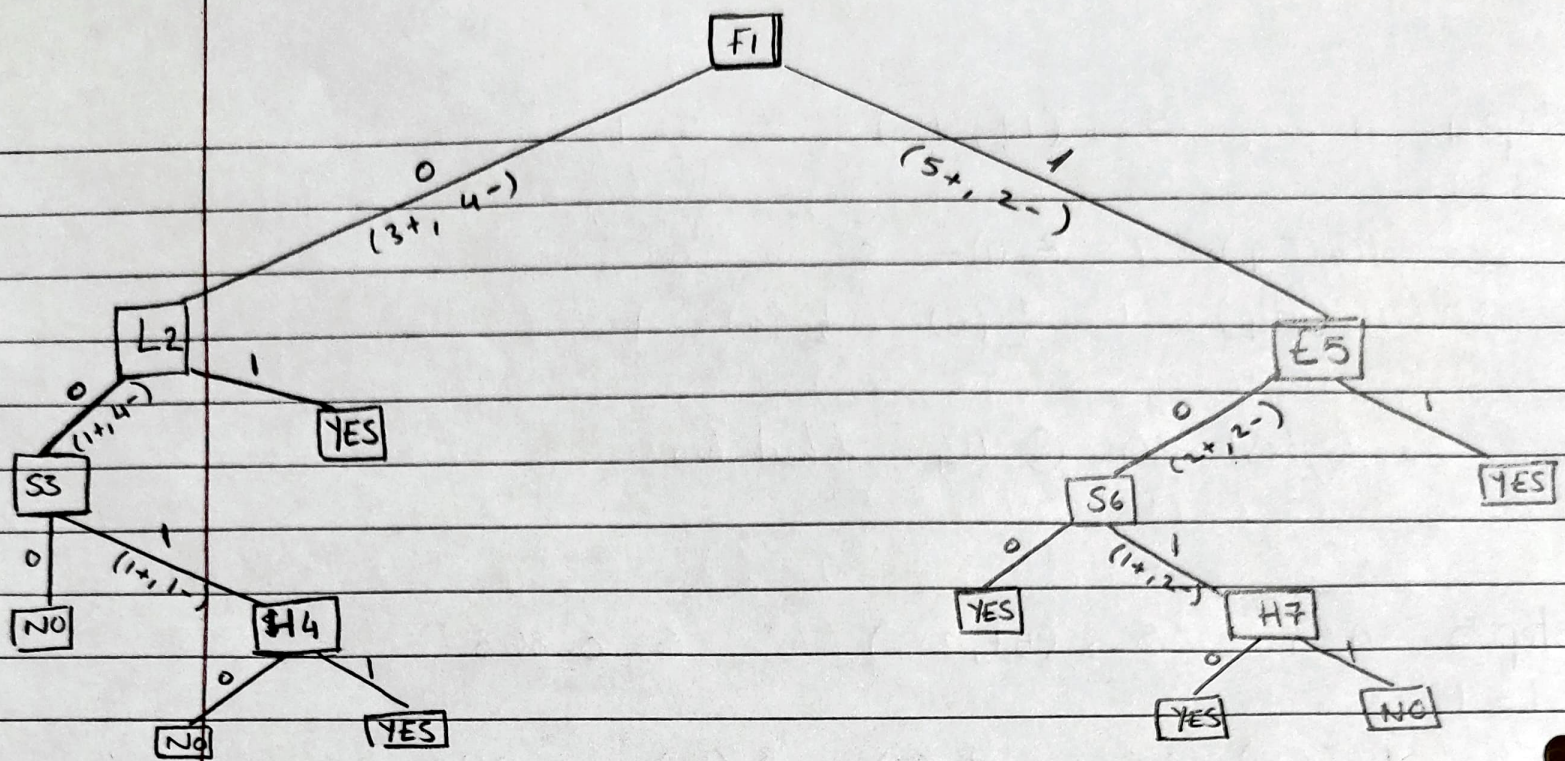$\qquad IG(H6) = 1 - \frac{1}{4}(0) - \frac{3}{4}(0.918) = 0.3115$

$\qquad \longrightarrow$ highest IG @ S6 and H6 ; senior and liked her

step 7 $\quad n=3 \qquad S \to (1+, 2-) \qquad\qquad S= 0.918$
$S6 = 1$

$\qquad IG(L7) = 0.918 - \frac{2}{3}(1) - \frac{1}{3}(0) = 0.2513$

$\qquad IG(H7) = 0.918 - \frac{1}{3}(0) - \frac{2}{3}(0) = 0.918$

$\qquad \longrightarrow$ highest IG @ H7 : liked her