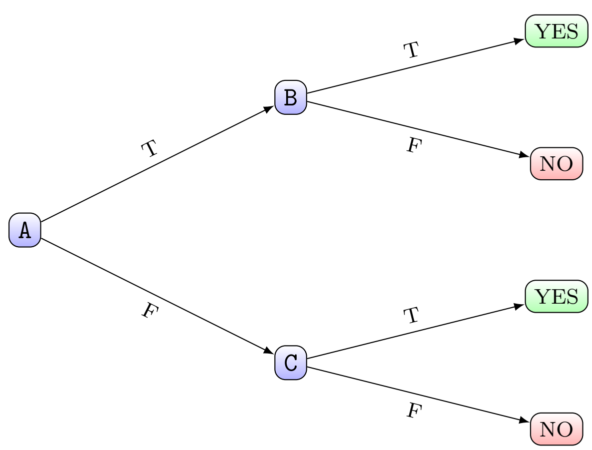
1. On the first round, we must consider all the attribute choices. We thus have:

$$\begin{aligned}
ENT(A,d) &= ENT(a,d) + ENT(\bar{a},d) \\
&= Pr(a)\big[-Pr(d|a)\cdot\log_2(Pr(d|a)) - Pr(d|a)\cdot\log_2(Pr(d|a))\big] \\
&+ Pr(\bar{a})\big[-Pr(d|\bar{a})\cdot\log_2(Pr(d|\bar{a})) - Pr(d|\bar{a})\cdot\log_2(Pr(d|\bar{a}))\big] \\
&= \frac{12}{23}\left[-\frac{3}{12}\log_2\left(\frac{3}{12}\right) - \frac{9}{12}\log_2\left(\frac{9}{12}\right)\right] + \frac{11}{23}\left[-\frac{7}{11}\log_2\left(\frac{7}{11}\right) - \frac{4}{11}\log_2\left(\frac{4}{11}\right)\right] \\
&\approx 0.876 \\
ENT(B,d) &= ENT(b,d) + ENT(\bar{b},d) \\
&= Pr(b)\big[-Pr(d|b)\cdot\log_2(Pr(d|b)) - Pr(d|b)\cdot\log_2(Pr(d|b))\big] \\
&+ Pr(\bar{b})\big[-Pr(d|\bar{b})\cdot\log_2(Pr(d|\bar{b})) - Pr(d|\bar{b})\cdot\log_2(Pr(d|\bar{b}))\big] \\
&= \frac{9}{23}\left[-\frac{2}{9}\log_2\left(\frac{2}{9}\right) - \frac{7}{9}\log_2\left(\frac{7}{9}\right)\right] + \frac{14}{23}\left[-\frac{8}{14}\log_2\left(\frac{8}{14}\right) - \frac{6}{14}\log_2\left(\frac{6}{14}\right)\right] \\
&\approx 0.899 \\
ENT(C,d) &= ENT(c,d) + ENT(\bar{c},d) \\
&= Pr(c)\big[-Pr(d|c)\cdot\log_2(Pr(d|c)) - Pr(d|c)\cdot\log_2(Pr(d|c))\big] \\
&+ Pr(\bar{c})\big[-Pr(d|\bar{c})\cdot\log_2(Pr(d|\bar{c})) - Pr(d|\bar{c})\cdot\log_2(Pr(d|\bar{c}))\big] \\
&= \frac{16}{23}\left[-\frac{6}{16}\log_2\left(\frac{6}{16}\right) - \frac{10}{16}\log_2\left(\frac{10}{16}\right)\right] + \frac{7}{23}\left[-\frac{4}{7}\log_2\left(\frac{4}{7}\right) - \frac{3}{7}\log_2\left(\frac{3}{7}\right)\right] \\
&\approx 0.964
\end{aligned}$$

Since splitting on A results in the lowest entropy and thus greatest information gain, we split on that first. This results in

$$\left\{\begin{array}{ll} \{+x_5, +x_7, -x_6, -x_8\}, & \text{for } A = F \\ \{+x_1, +x_2, -x_3, -x_4\}, & \text{for } A = T \end{array}\right\}$$

At this point we have completed our search, since $ENT(C|\bar{a}) = ENT(B|a) = 0$.
Therefore, our resulting tree is:



2. We assume that all nodes utilize the step function with threshold t as labeled on the node. These are therefore of the form

$$g(I) = \left\{ \begin{array}{ll} 1, & \text{for } I \geq t \\ 0, & \text{for } I < t \end{array} \right\}$$

Numbers appearing directly above or below an edge are weights. Thus our network is: