CS 402 – Assignment 2 Solutions

Q1. Minimax and pruning

5

5   4
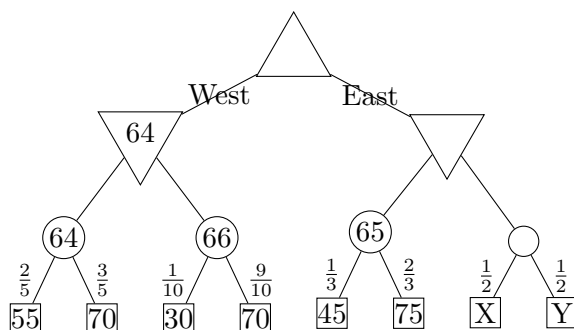
8   6   7   5   9   8   4   6

9   3   8   1   2   3   2   4   0   5   6
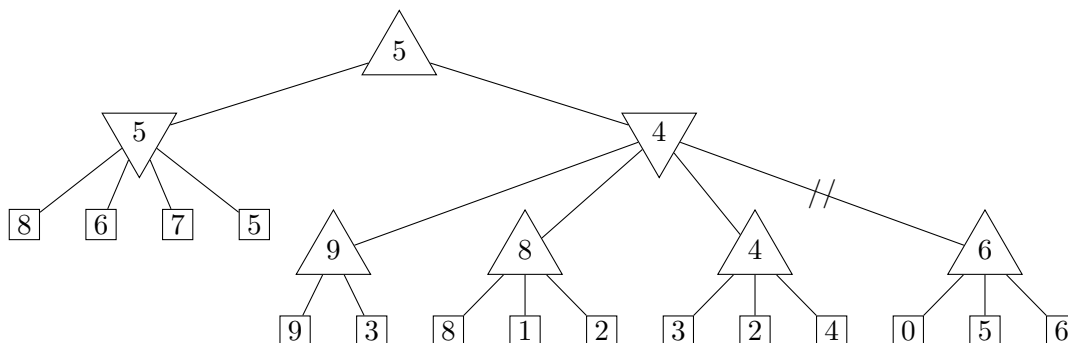
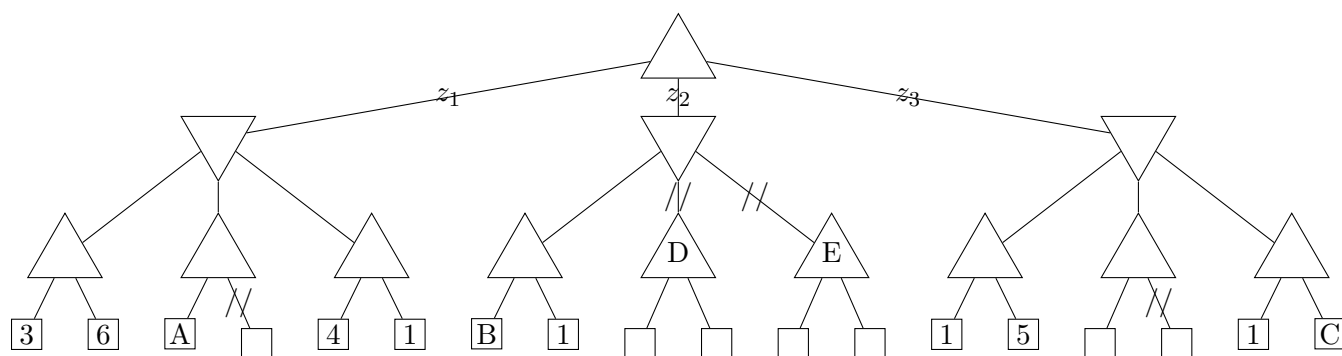Pruning: the slashed subtree is pruned since after values 9,8,4 we have $\beta = 4 \leq \alpha = 5$.

Q2. Pacman with chance nodes

Assume $X, Y \in \{0, 1, 2, \dots\}$ (whole-number pellets).

West   East

64

64   66   65

$\frac{2}{5}$ $\frac{3}{5}$ $\frac{1}{10}$ $\frac{9}{10}$ $\frac{1}{3}$ $\frac{2}{3}$ $\frac{1}{2}$ $\frac{1}{2}$

55   70   30   70   45   75   X   Y

- Move EAST iff $\min(65, \frac{X+Y}{2}) > 64 \;\Rightarrow\; X + Y \geq 129$.

- Definitely reach P4 iff $64 < \frac{X+Y}{2} < 65 \;\Rightarrow\; X + Y = 129$.

Q3. Alpha–beta bounds

z_1 z_2 z_3

D   E

3   6   A   4   1   B   1   1   5   1   C

Answers:

1. Bounds: $6 \leq A \leq \infty$; $-\infty \leq B \leq 4$.

1

2. With B maximal and consistent, left and center tie, both one more than right $\Rightarrow C = 3$.

3. z_2 always equals z_1 when $4 \leq D \leq \infty$ and $4 \leq E \leq \infty$.