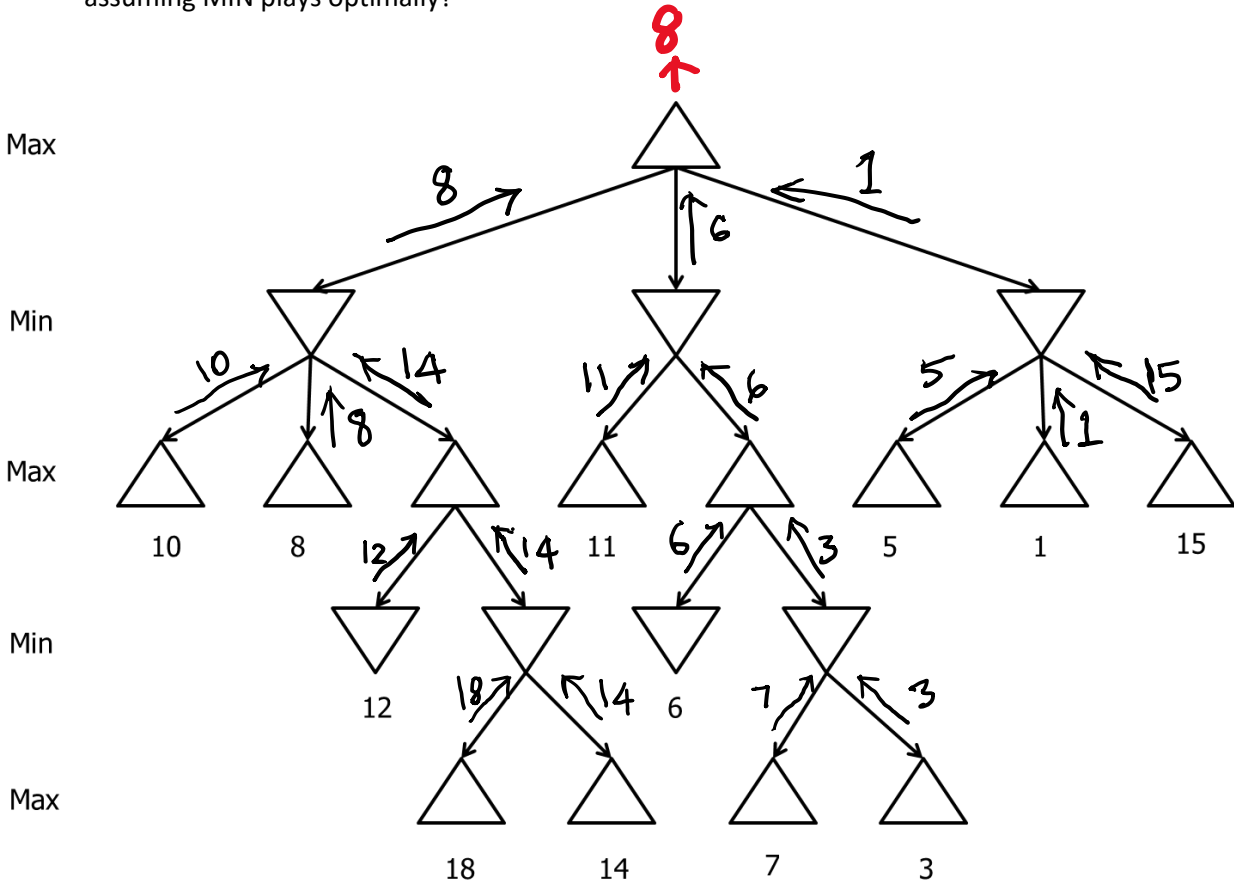


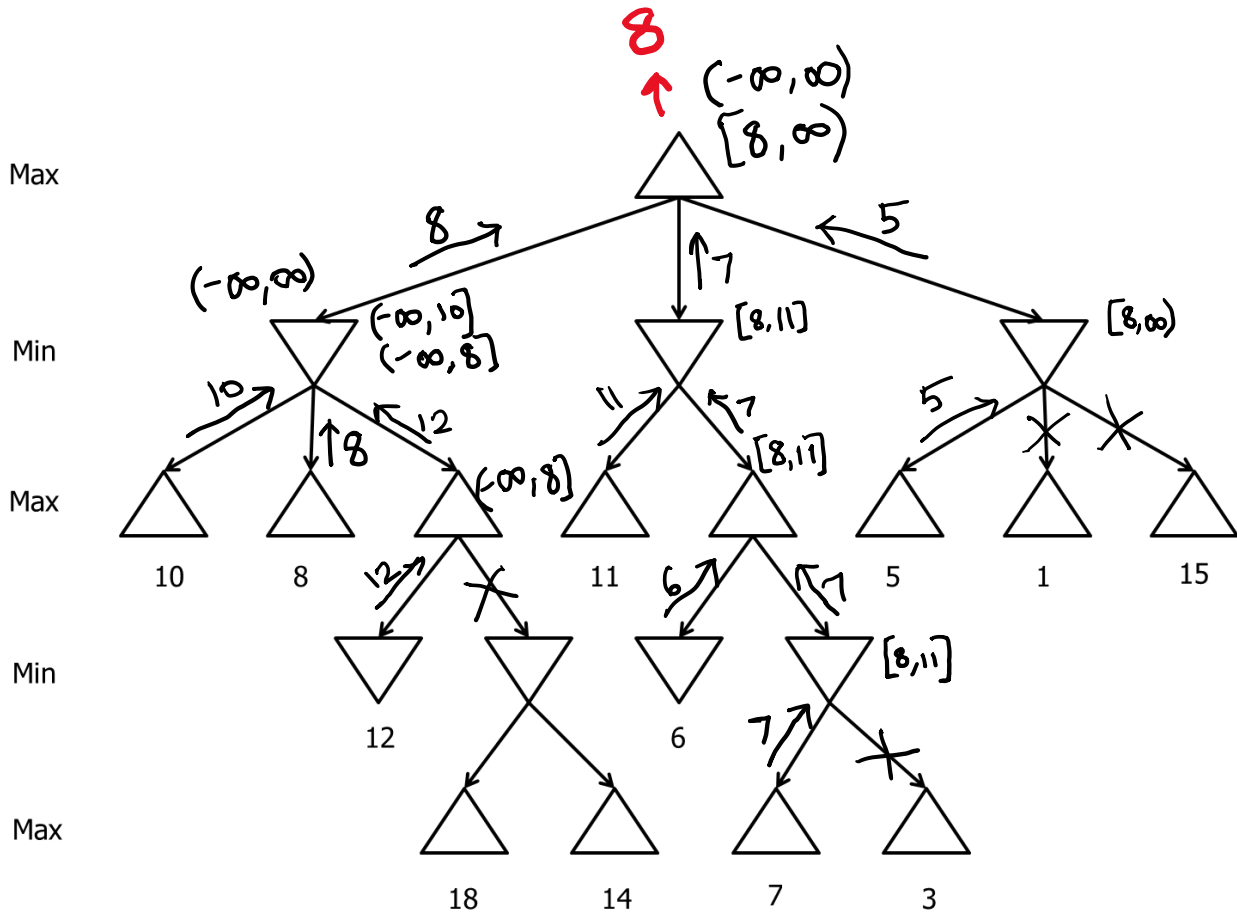
**CS 480 – Assignment 3
Solutions**

- Hand trace the mini-max algorithm. What is the maximum utility that MAX can achieve, assuming MIN plays optimally?



Assuming min plays optimally, the maximum utility that MAX can achieve is 8.

2. Hand trace the alpha-beta search. Show the updated bounds on the nodes. Clearly mark which branches are pruned, if any.



The maximum utility that MAX can achieve is 8.

3. Given

The variables and domains are as follows.

A: {4, 5, 6, 7, 8}

B: {10, 20, 30, 40}

C: {2, 3, 4}

D: {28, 43, 56, 77, 94, 114}

The constraints are:

A + C is odd.

A + D is a square of an integer.

B + D < 60.

	C = 2	A = 5	A = 7	D = 114
A={4,5,6,7,8}	{5,7}	5	7	7
B={10,20,30,40}	{10,20,30,40}	{10,20,30,40}	{10,20,30,40}	Φ
C={2,3,4}	2	2	2	2
D={28,43,56,77,94,114}	{28,43,56,77,94,114}	Φ	{114}	114

C = 3	A = 4	D = 77	A = 6	D = 43	B = 10
{4,6,8}	4	4	6	6	6
{10,20,30,40}	{10,20,30,40}	Φ	{10,20,30,40}	{10}	10
3	3	3	3	3	3
{28,43,56,77,94,111}	{77}	77	{43,94}	{43}	43

Therefore,

A = 6

B = 10

C = 3

D = 43

4. Cryptarithmic problem

Domains:

O: {6, 7, 8, 9}

R: {0, 2...9}

W: {5...9}

U: {0, 2...9}

T: {5...9}

Constraints:

$O + O = 10 + R$

$W + W + 1 = 10 + U$

$T + T + 1 = 10 + O$

It is assumed that $F = 1$

	O = 6	O = 7	R = 4	T = 8	W = 5
O = {6,7,8,9}	6	7	7	7	7
R={0,2,3,4,5, 6,7,8,9}	{2}	{4}	4	4	4
W={5,6,7,8,9}	{5,7,8,9}	{5,6,8,9}	{5,6,8,9}	{5,6,9}	5
U={0,2,3,4,5, 6,7,8,9}	{0,2,3,4,5, 7,8,9}	{0,2,3,4,5, 6,8,9}	{0,2,3,5, 6,8,9}	{0,2,3,5,6,9}	Φ
T={5,6,7,8,9}	Φ	{8}	{8}	8	8

W = 6	U = 3
7	7
4	4
6	6
{3}	3
8	8

Therefore,

O = 7

R = 4

W = 6

U = 3

T = 8

F = 1