Prescriptive Analytics - HW 7

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1. Readings completed

2. John's Problem:

   Payoff Matrix:

	Re-Elected	Not re-elected
Sell half of the business	480,000	70,000
Sell entire business	260,000	260,000

   Maxi-Min & Maxi-Max Approaches:

	Re-Elected	Not re-elected	Maxi-Min	Maxi-Max
Sell half of the business	480,000	70,000	70,000	480,000
Sell entire business	260,000	260,000	260,000	260,000

   Mini-Max Regret Approach:

	Re-Elected	Not re-elected	Mini-Max Regret
Sell half of the business	0	190,000	190,000
Sell entire business	220,000	0	220,000

   Maxi-Min: $260,000 payoff **(Decision: Sell the entire business)**
   Maxi-Max: $480,000 payoff **(Decision: Sell half of the business)**
   Mini-Max Regret: $190,000 **(Decision: Sell half of the business)**

   MO: 0.65(Not re-elected) > 0.35(Re-elected) → $260,000 > $70,000
   (Decision: Sell his entire business)

EV: Sell half of the business →   0.35($480,000)+0.65($70,000)   = $213,500

           Sell entire business →   0.35($260,000)+0.65($260,000)   = $260,000

           (Decision: Sell his entire business)

ER: Sell half of the business →   0.35($0)+0.65($190,000)   = $123,500

           Sell entire business →   0.35($220,000)+0.65($0)   = $77,000
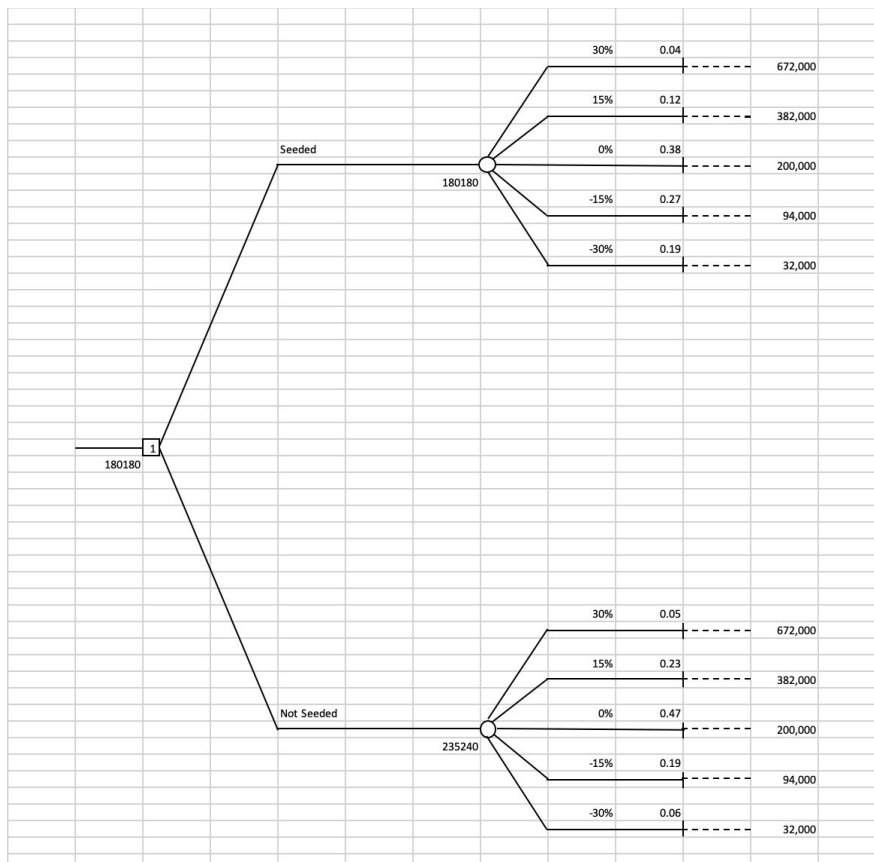
           (Decision: Sell his entire business)

Expected payoff with PI   = 0.35($480,000)+0.65($260,000) = $337,000

Expected payoff based on EV   = $260,000

EVPI   = |$337,000 - $260,000| = $77,000 (Equal to ER)

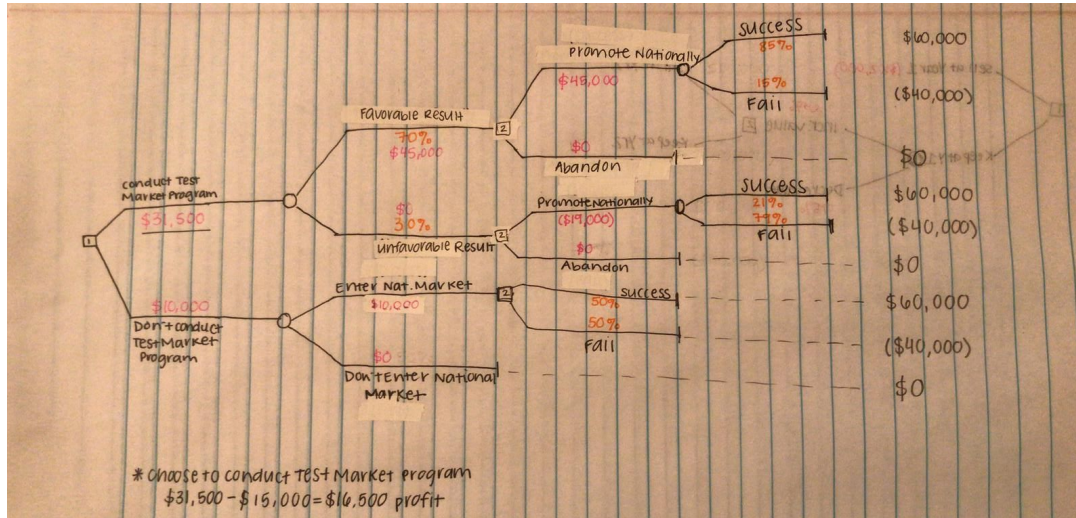**(Decision: John should accept the offer)**

3. Decision Tree:

Property damage from seeding is lower.

4. Decision Tree:
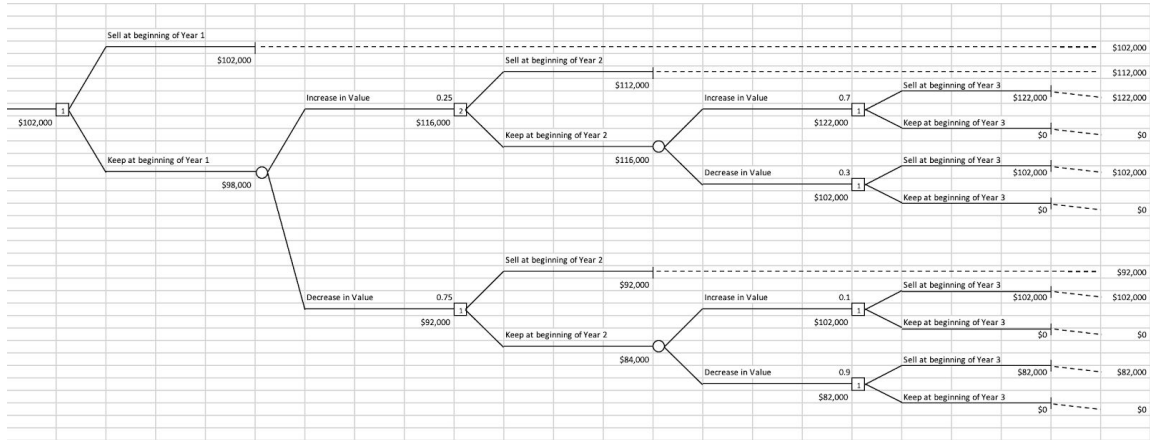
Decision: Sell at beginning of Year 1

5.

6.

Path	Length	Slack
1-2-3-8-9	3+7+9+3 = 22	30 - 22 = 8
1-2-3-7-8-9	3+7+7+7+3 = 27	30 - 27 = 3
1-2-4-5-6-7-8-9	3+5+3+4+3+7+3 = 28	30 - 28 = 2
1-2-4-5-7-8-9	3+5+3+8+7+3 = 29	30 - 29 = 1

1-2-4-5-8-9	3+5+3+8+3 = 22	30 - 22 = 8
1-2-5-6-7-8-9	3+9+4+3+7+3 = 29	30 - 29 = 1
1-2-5-7-8-9	3+9+8+7+3 = **30**	30 - 30 = 0
1-2-5-8-9	3+9+8+3 = 23	30 - 23 = 7

(1) Critical path: 30
(2) Critical activities: 1-2-5-7-8-9
(3) 30 weeks
(4) See aforementioned chart for answers
(5) Yes, Activity I is a critical activity; any delays to a critical activity will lengthen the projoect duration
(6) No, Activity L is not a critical activity; any delays to a noncritical activity won't lengthen the project duration

7.
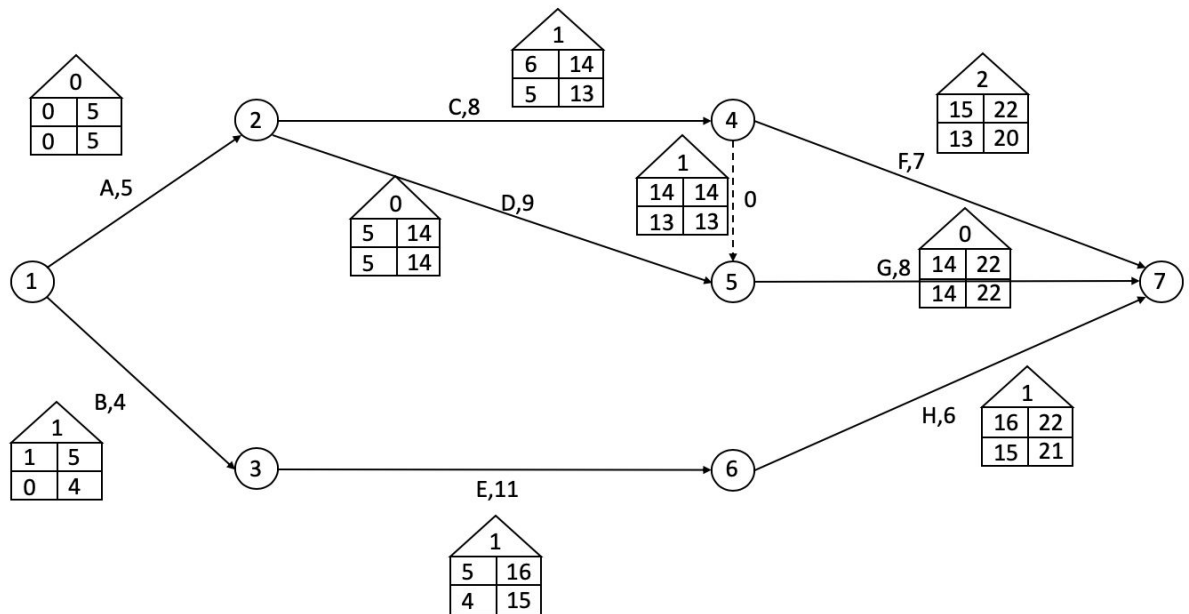
Critical Activities: A (1-2), D (2-5), G (5-7)
Critical Path: 1-2-5-7
Project Duration: 22 days

8.

(1)

Minimize Z = XJ

Subject to:

XA = 0

XB-XA $\geq$ 0

XC-XB $\geq$ 0

XD-XA $\geq$ 0

XE-XC $\geq$ 0

XF-XE $\geq$ 0

XG-XD $\geq$ 0

XH-XE $\geq$ 0

XI-XH $\geq$ 0

XI-XG $\geq$ 0

XJ-XF $\geq$ 0

XJ-XI $\geq$ 0

XA, ... , XJ $\geq$ 0

(2) .

(3) Yes, the project durations match for both methodologies