EXTRA PROBLEM 8 - VALUE OF PERFECT INFORMATION

Mister Smith is trying to decide between investing $10,000 windfall into a savings account at a 10% yearly interest rate or a new stock. The return on the new stock is linked in part to the overall stock market behavior as exhibited by the DOW JONES INDEX. If the **DOW JONES INDEX increases** on the average during the year then there is a probability of **0.8** that the stock value will increase. If the **DOW JONES INDEX decreases** on the average during the year, then there is a probability **0.3** that the stock will increase. The probability that the **DOW JONES INDEX increases** on the average during the coming year is **0.55**. The net payoff in one year on the investment of $10,000 for these events is as follows

	STOCK VALUE	
	Increase	Decrease
DOW JONES INDEX Increases	$8,000	-$5,000
DOW JONES INDEX Decreases	$2,000	-$10,000

That is, if the DOW JONES INDEX increases on the average during the year and the stock value increases, then after one year mister Smith will have $10,000+$8,000 = $18,000 dollars. Use the following notation when answering the question below.
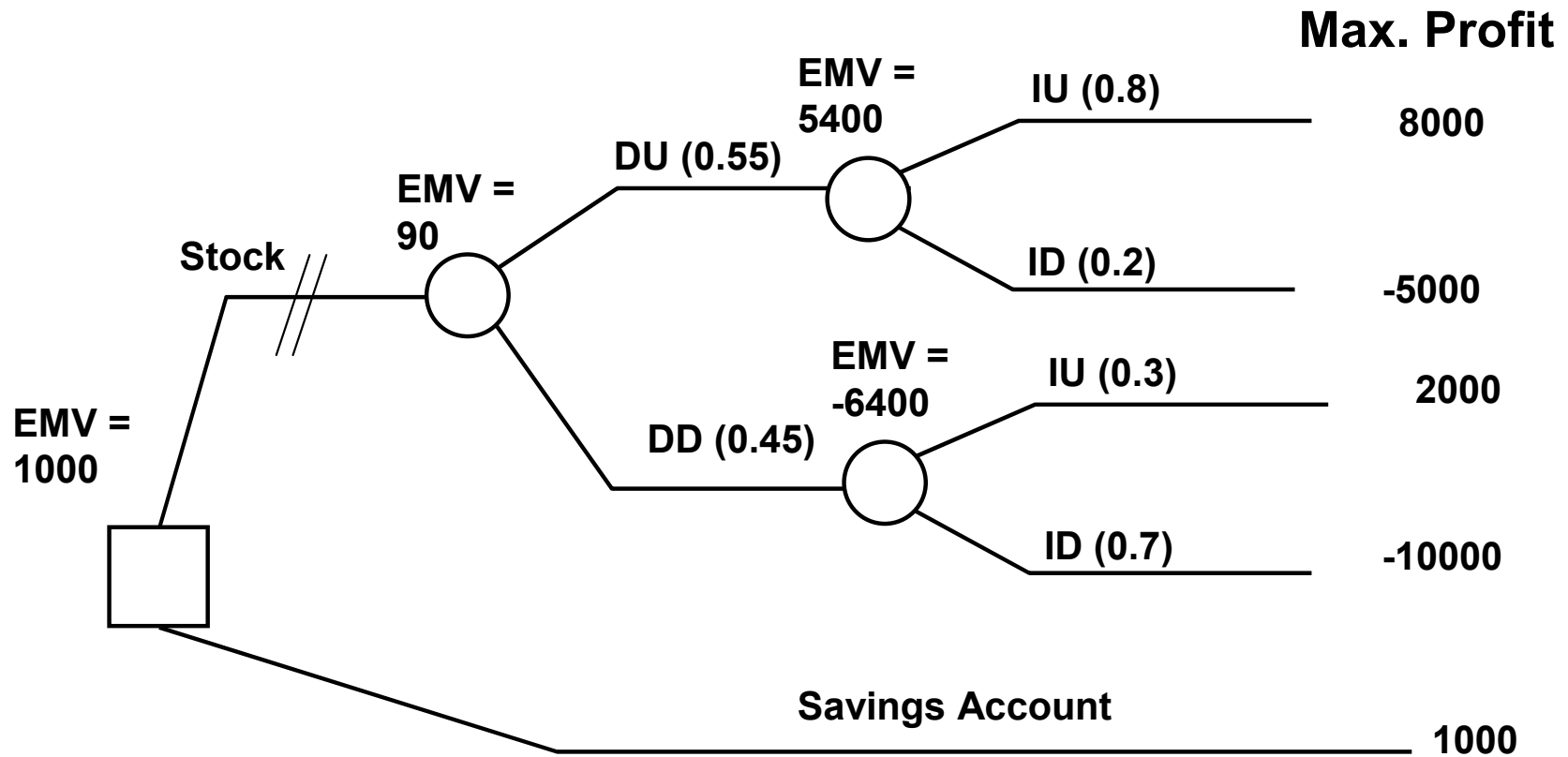
IU = INDIVIDUAL STOCK GOES UP,

ID = INDIVIDUAL STOCK GOES DOWN

DU = DOW JONES INDEX GOES UP

DD = DOW JONES INDEX GOES DOWN

A. Draw the decision tree for the problem at hand and solve the problem using EMV. Assume a one year time frame for the decision analysis. What is the optimal decision?

Max. Profit

EMV = 5400

DU (0.55)

EMV = 90

Stock

IU (0.8) 8000

ID (0.2) -5000

EMV = -6400

DD (0.45)

IU (0.3) 2000

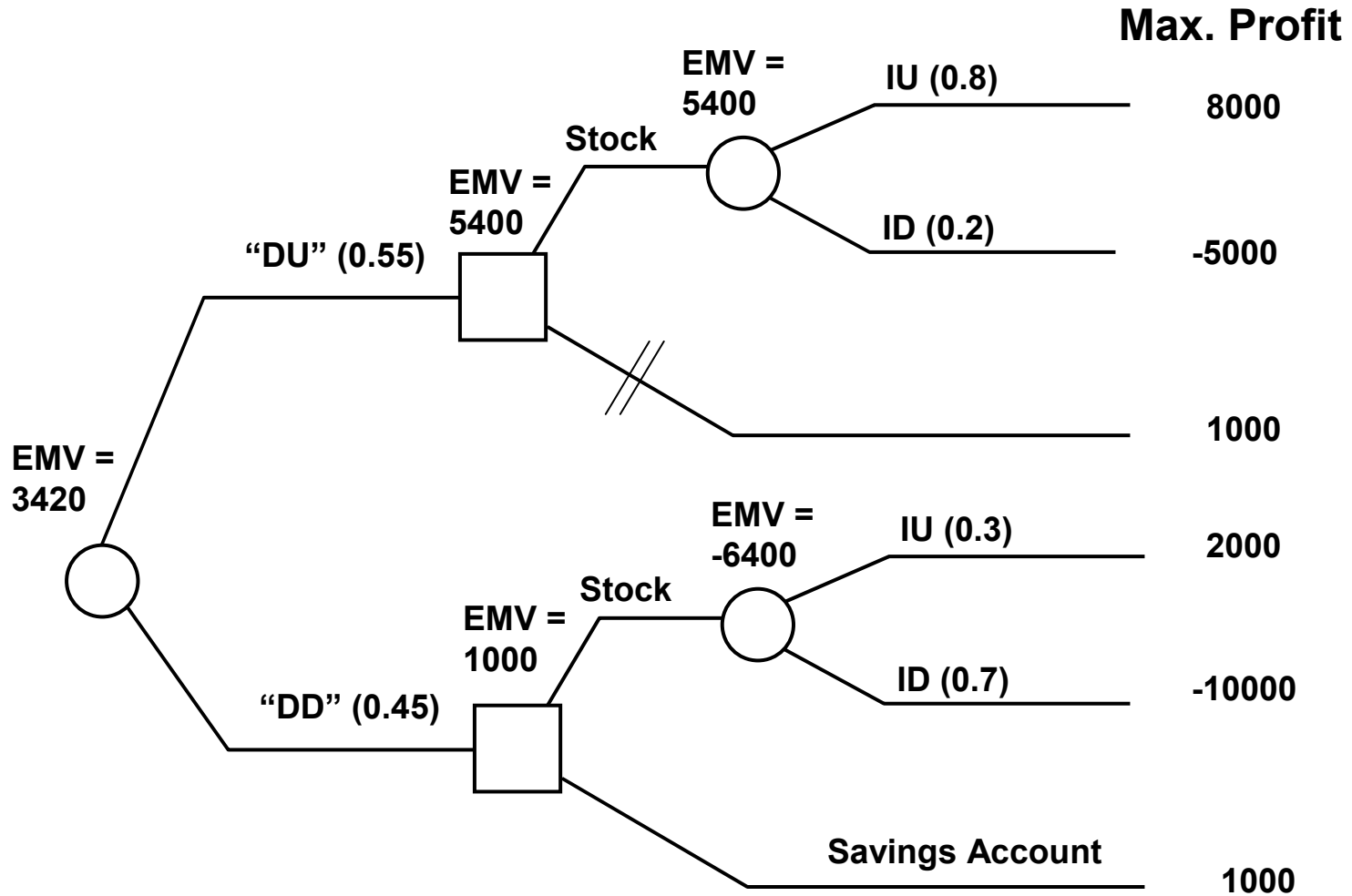ID (0.7) -10000

EMV = 1000

Savings Account 1000

OPTIMAL DECISION IS TO PUT MONEY IN SAVINGS ACCOUNT!

B. Fill in the blanks of the following probability table. Round numbers off to three decimal places.
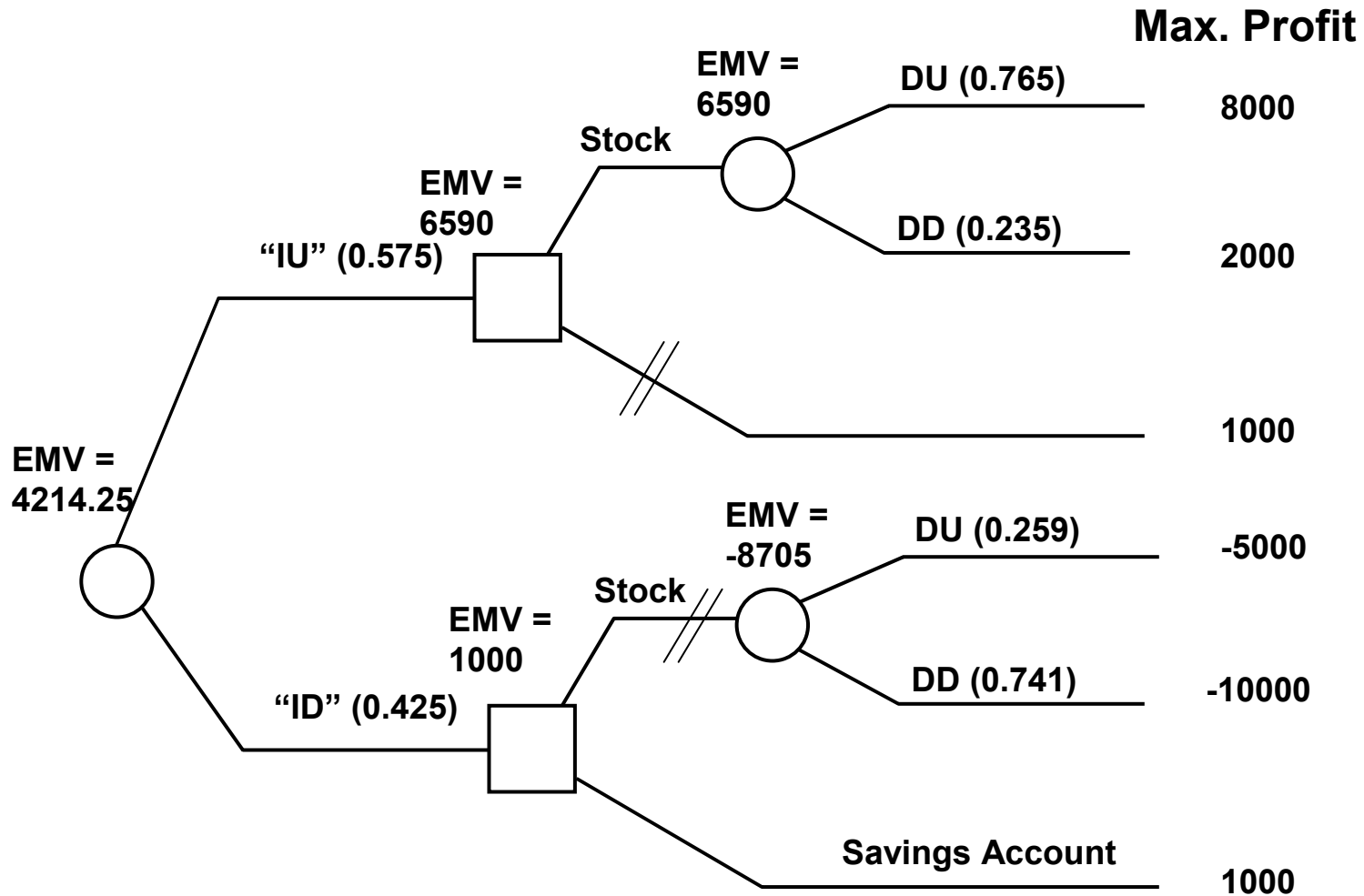
X	(0.550) Pr(X|DU)	(0.450) Pr(X|DD)	Pr(X ∩ DU)	Pr(X ∩ DD)	Pr(X)	Pr(DU|X)	Pr(DD|X)	CHECK
IU	0.800	0.300	0.440	0.135	0.575	0.765	0.235	1
ID	0.200	0.700	0.110	0.315	0.425	0.259	0.741	1
CHECK			0.550	0.450				

C. Draw the decision tree for assessing the worth of PERFECT information regarding the DOW JONES INDEX. What is the EVPI regarding the DOW JONES INDEX.

Max. Profit

Stock — EMV = 5400

- IU (0.8) — 8000
- ID (0.2) — -5000

"DU" (0.55) — EMV = 5400

1000

EMV = 3420

Stock — EMV = -6400

- IU (0.3) — 2000
- ID (0.7) — -10000

"DD" (0.45) — EMV = 1000

Savings Account — 1000

EVPI DOW JONES INDEX = 3420 - 1000 = 2420

D. Draw the decision tree for assessing the worth of PERFECT information regarding the INDIVIDUAL STOCK BEHAVIOR. What is the EVPI regarding the INDIVIDUAL STOCK BEHAVIOR.

Max. Profit

EMV = 6590

Stock

DU (0.765)   8000

DD (0.235)   2000

EMV = 6590

"IU" (0.575)

1000

EMV = 4214.25

EMV = -8705

Stock

DU (0.259)   -5000

DD (0.741)   -10000

EMV = 1000

"ID" (0.425)

Savings Account   1000

EVPI INDIVIDUAL STOCK = 4214.25 - 1000 = 3214.25

E. What information would you rather get. Base your answer on the outcome of part C and part D and provide an explanation.

EVPI INDIVIDUAL STOCK = 3214.25 > EVPI DOW JONES INDEX = 2420

Hence, I prefer the perfect information about the Individual Stock Behavior