EXERCISE 1.5 Javier Peña has always been interested in financing artistic projects. He has recently been offered two financing opportunities in the fashion industry: financing a new line of avant-garde youth fashions designed by Jorge Vera, and financing a line of business attire designed by Paolo Ricci. Javier has had a lot of past experience with these two designers, and has observed that 20% of Vera's fashion lines are "hits" and 80% of them are "misses." Furthermore, Ricci's fashion lines are "hits" 30% of the time, and are "misses" 70% of the time.

Javier's net liquid assets amount to $750,000. As a result, he can afford to finance at most one of the two fashion lines. However, he does have the option of pre-testing at most one of the fashion lines at the upcoming design show in San Francisco, before deciding which, if any, fashion line he would like to finance for the entire U.S. market for the fall fashion season. The costs and revenue associated with the two fashion lines are given in Table 1.6.

Javier has observed, based on previous years, that of the avant-garde fashion lines that were hits nationwide, 80% were hits in the San Francisco pre-test; of the avant-garde fashion lines that were misses nationwide, 40% were hits in the San

Fashion Line:	*Jorge Vera (avant-garde)*	*Paolo Ricci (business attire)*
Net cost of San Francisco pre-test	$200,000	$75,000
Additional cost of U.S. production of line after a San Francisco pre-test	$500,000	$275,000
Cost of U.S. production if not pre-tested in San Francisco	$600,000	$325,000
Revenue if fashion line is a "hit"	$4,000,000	$1,000,000
Revenue if fashion line is a "miss"	$300,000	$100,000

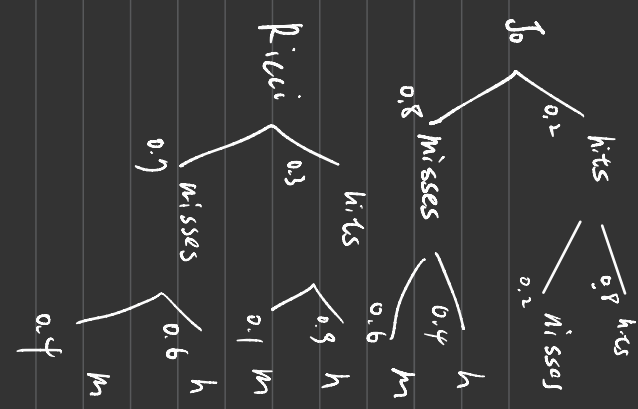
Tumor	*Remove Tumor*	*Leave Tumor*
Benign	5	8
Malignant	5	1

Francisco pre-test. Of the business attire fashion lines that were hits nationwide, 90% were hits in the San Francisco pre-test; of the business attire fashion lines that were misses nationwide, 60% were hits in the San Francisco pre-test. While Javier may find pre-test results useful, he knows the accuracy of this kind of test is not high enough to compel him in all cases to act in accordance with the pre-test results. In any event, Javier is willing to act on the basis of expected monetary values.

(a) Develop a decision tree to assist Javier in deciding what to do.

(b) What probabilities need to be computed in order to solve the decision tree?

(c) After reading Chapter 2, compute the necessary probabilities, and solve for Javier's optimal decision strategy.



Jo

$\begin{cases} P(P\text{-}H \mid N\text{-}H) = 0.8 \\ P(P\text{-}H \mid N\text{-}m) = 0.4 \end{cases}$

↓

$$\frac{P(P\text{-}H \wedge N\text{-}H)}{P(N\text{-}H)} = 0.8$$

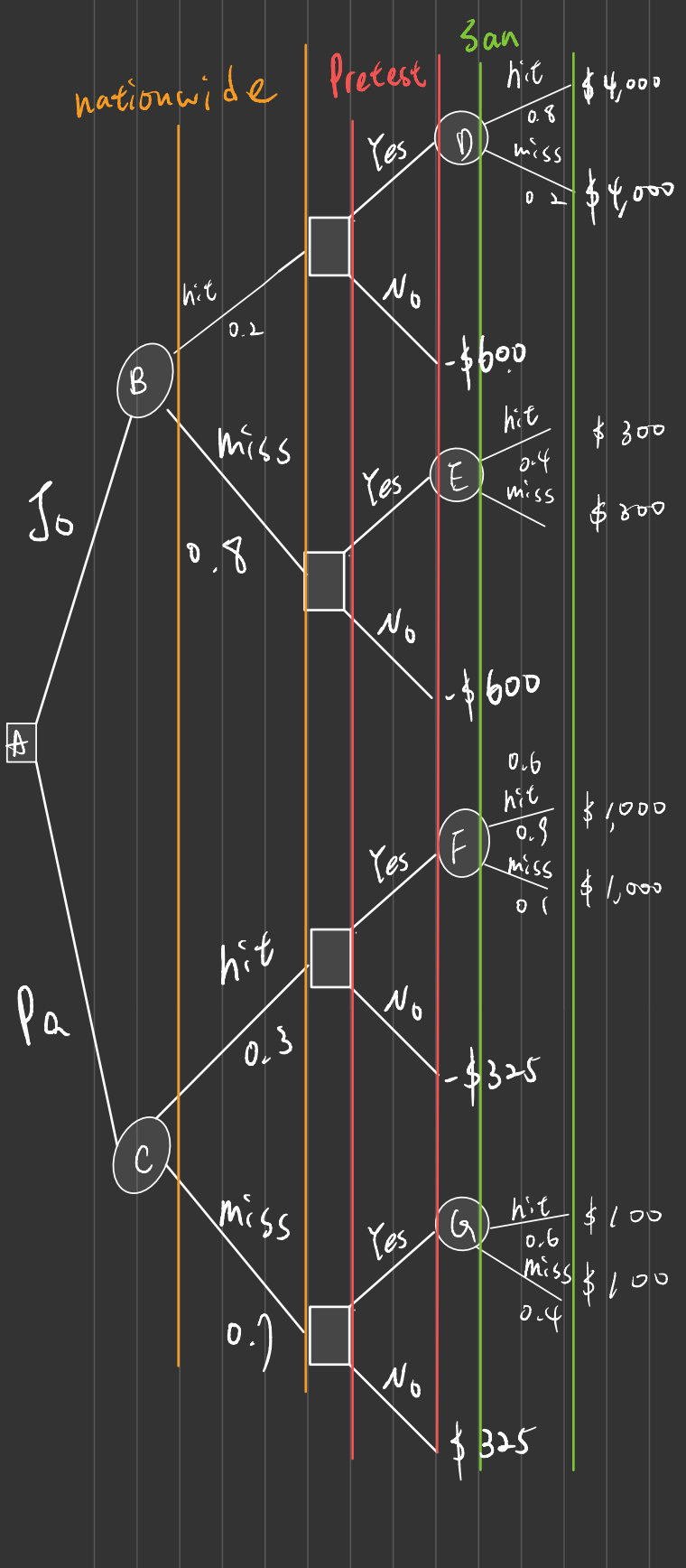
$P(P\text{-}H \wedge N\text{-}H) = 0.8 \times 0.2 = 0.16$

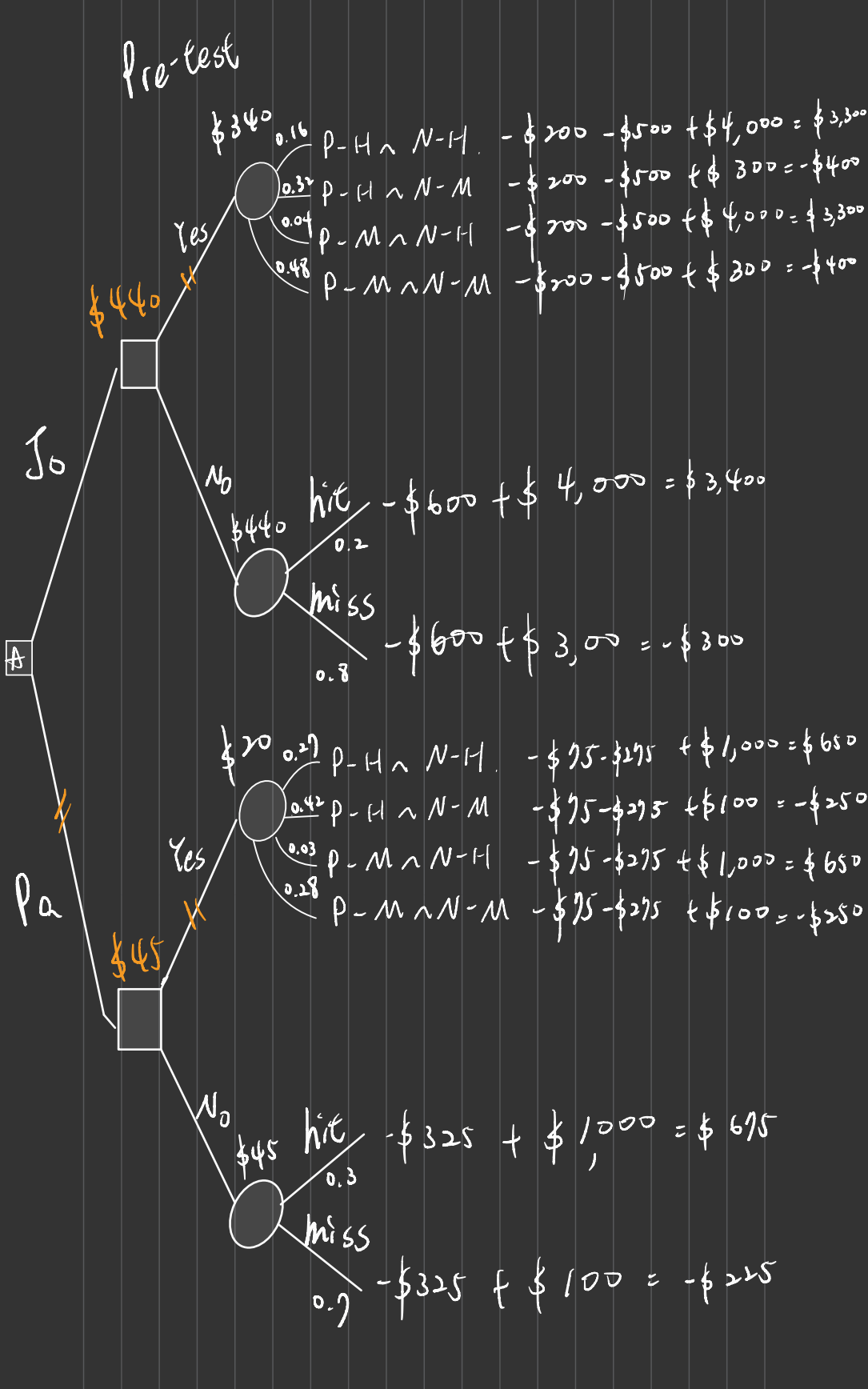
$P(P\text{-}H \wedge N\text{-}m) = 0.4 \times 0.8 = 0.32$

$P(P\text{-}m \wedge N\text{-}H) = ?$

$P(P\text{-}m \wedge N\text{-}m) = ?$

$P(P\text{-}m \mid N\text{-}H)$


nationwide
Pretest
Ban
A
B
C
D
E
F
G
Yes
No
hit
miss
0.2
0.8
0.3
0.7
0.8
0.2
0.4
0.6
0.9
0.1
0.6
0.4
-$600
-$600
-$325
$325
$4,000
$4,000
$800
$800
$1,000
$1,000
$100
$100


Pre-test
$340
0.16
P-H ∧ N-H
-$200 -$500 +$4,000 = $3,300
0.32
P-H ∧ N-M
-$200 -$500 +$300 = -$400
0.04
P-M ∧ N-H
-$200 -$500 +$4,000 = $3,300
0.48
P-M ∧ N-M
-$200 -$500 +$300 = -$400
Yes
$440
Jo
No
$440
hit
0.2
-$600 +$4,000 = $3,400
miss
0.8
-$600 +$3,00 = -$300
A
$20
0.27
P-H ∧ N-H
-$75 -$275 +$1,000 = $650
0.42
P-H ∧ N-M
-$75 -$275 +$100 = -$250
0.03
P-M ∧ N-H
-$75 -$275 +$1,000 = $650
0.28
P-M ∧ N-M
-$75 -$275 +$100 = -$250
Yes
Pa
$45
No
$45
hit
0.3
-$325 +$1,000 = $675
miss
0.7
-$325 +$100 = -$225

J_0

- $P(S\text{-}M \mid N\text{-}H) = 0.2 \Rightarrow P(S\text{-}M \wedge N\text{-}H) = 0.2 * P(N\text{-}H) = 0.04$
- $P(S\text{-}H \mid N\text{-}H) = 0.8 \Rightarrow P(S\text{-}H \wedge N\text{-}H) = 0.8 * P(N\text{-}H) = 0.16$
- $P(S\text{-}H \mid N\text{-}M) = 0.4 \Rightarrow P(S\text{-}H \wedge N\text{-}M) = 0.4 * P(N\text{-}M) = 0.32$
  - $P(S\text{-}M \mid N\text{-}M) = 0.6 \Rightarrow P(S\text{-}M \wedge N\text{-}M) = 0.6 * P(N\text{-}M) = 0.48$

R_1

- $P(S\text{-}M \mid N\text{-}H) = 0.1 \Rightarrow P(S\text{-}M \wedge N\text{-}H) = 0.1 * P(N\text{-}H) = 0.03$
- $P(S\text{-}H \mid N\text{-}H) = 0.9 \Rightarrow P(S\text{-}H \wedge N\text{-}H) = 0.9 * P(N\text{-}H) = 0.27$
- $P(S\text{-}M \mid N\text{-}M) = 0.6 \Rightarrow P(S\text{-}H \wedge N\text{-}M) = 0.6 * P(N\text{-}M) = 0.42$
  - $P(S\text{-}H \mid N\text{-}M) = 0.4 \Rightarrow P(S\text{-}M \wedge N\text{-}M) = 0.4 * P(N\text{-}M) = 0.28$