

AP[®] Statistics (Operational) 2004 Sample Student Responses

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- 4. Two antibiotics are available as treatment for a common ear infection in children.
 - Antibiotic A is known to effectively cure the infection 60 percent of the time. Treatment with antibiotic A costs \$50.
 - Antibiotic B is known to effectively cure the infection 90 percent of the time. Treatment with antibiotic B costs \$80.

The antibiotics work independently of one another. Both antibiotics can be safely administered to children. A health insurance company intends to recommend one of the following two plans of treatment for children with this ear infection.

- Plan I: Treat with antibiotic A first. If it is not effective, then treat with antibiotic B.
- Plan II: Treat with antibiotic B first. If it is not effective, then treat with antibiotic A.
- (a) If a doctor treats a child with an ear infection using plan I, what is the probability that the child will be cured?

$$p(corre) = p(A corres +) + p(B corres +) \cdot p(Adidut, corre +)$$

$$p(corre) = 1.6 + (.9)(.4)$$

$$= .6 + .36$$

$$p(corre) = .96$$

If a doctor treats a child with an ear infection using plan II, what is the probability that the child will be cured?

$$p(\text{cure}) = p(\text{B cures } : +) + p(\text{A cures } : +) = p(\text{B didn't cure } : +)$$

$$= .9 + (.6)(.1)$$

$$= .9 + .06$$

$$p(\text{cure}) = .96$$

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(b) Compute the expected cost per child when plan I is used for treatment.

expected of cost
$$A$$
 + cost $B \cdot p$ (Adversity corne it)
$$= \frac{1}{50} + \frac{1}{30} \cdot (.4)$$

$$= \frac{1}{50} + \frac{1}{34}$$

$$= \frac{1}{50} + \frac{1}{34}$$

Compute the expected cost per child when plan II is used for treatment.

(c) Based on the results in parts (a) and (b), which plan would you recommend? Explain your recommendation.

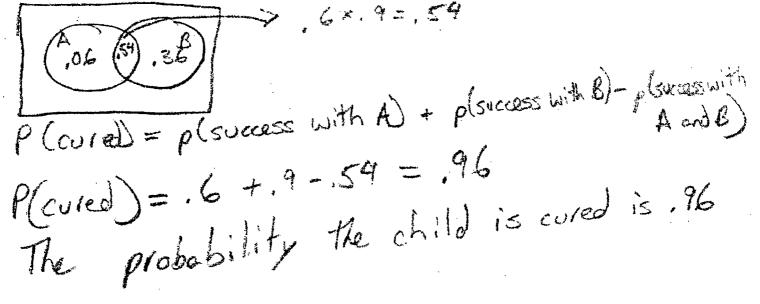
I would recomment plan I. the probability that the child will be comed is the same, so that does not effect the choice. However, on every, plan I will cost less than plan II. Each child will cost on average 82 on plan I, while costing 85 on plan II. Since the in surance companies hormally end up paying for the weditation, they would want to recommend the plan that how cost them the best per child on average.

- 4. Two antibiotics are available as treatment for a common ear infection in children.
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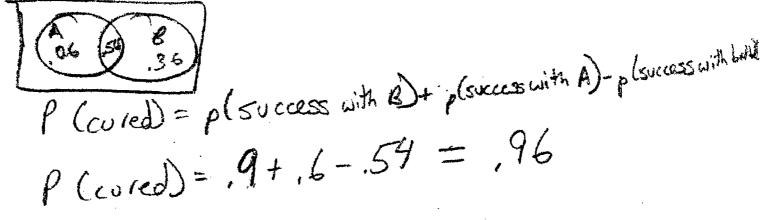
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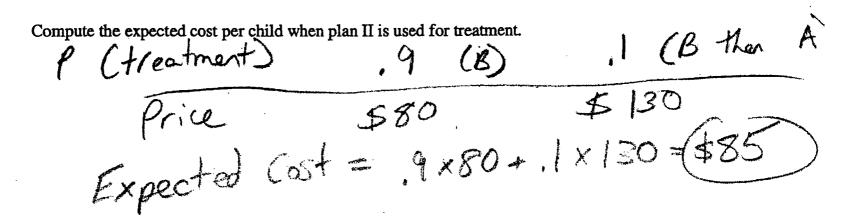
(a) If a doctor treats a child with an ear infection using plan I, what is the probability that the child will be cured?



If a doctor treats a child with an ear infection using plan II, what is the probability that the child will be cured?



(b) Compute the expected cos	st per child when plan I is used for treatment.	.4	(A then B)
Price	550	\$130	\$82
Expected (Cost = $16 \times 50 + 14 \times$	130 =	



(c) Based on the results in parts (a) and (b), which plan would you recommend? Explain your recommendation.

- 1) commend from I - Both	
I would recommend from I both treatments have the same probability treatments have the same probability	
treatments it is the	<u>t</u>
of control in realerse order.	
the same procedure in reverse order. However, the expected cost for II. However, the expected while the expected	
However, the expected while the expected is \$85 per child, while the expected are child.	
is \$85 per child, w"	
cost for plan I is \$82 per child.	
COST TO PIEN T	
Since Plan I is less costly, I would	
de la composión do	
recommend the insurance company to	
go with Plan I.	