Homework 2

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Exercises

4.2 There are two events A and B. $P(A) = .5$ and $P(B) = .3$. The events A and B are independent.

(a) **Find P($\tilde{\mathbf{A}}$)**

(b) **Find P($\mathbf{A} \cap \mathbf{B}$)**

(c) **Find P($\mathbf{A} \cup \mathbf{B}$)**

4.4 There are two events A and B. $P(A) = .7$ and $P(B) = .8$. $P(\tilde{A} \cap \tilde{B}) = .1$.

(a) **Are A and B independent events? Explain why or why not.**

(b) **Find P($\mathbf{A} \cup \mathbf{B}$)**

4.6 Two fair dice, one red and one green, are rolled. Let the event A be "the sum of the faces showing is equal to seven." Let the event B be "the faces showing on the two dice are equal."

(a) **List out the sample space of the experiment.**

(b) **List the outcomes in A, and find P(A).**

(c) **List the outcomes in B, and find P(B).**

(d) **List the outcomes in $\mathbf{A} \cap \mathbf{B}$, and find P($\mathbf{A} \cap \mathbf{B}$).**

(e) **Are the events A and B independent? Explain why or why not.**

(f) **How would you describe the relationship between event A and event B?**

4.8 Two dice are rolled. The red die has been loaded. Its probabilities are $P(1) = P(2) = P(3) = P(4) = \frac{1}{5}$ and $P(5) = P(6) = \frac{1}{10}$. The green die is fair. Let the event A be "the sum of the faces showing is an even number." Let the event B be "the sum of the faces showing is divisible by 3."

(a) **List the outcomes in A, and find P(A).**

(b) **List the outcomes in B, and find P(B).**

(c) **List the outcomes in $\mathbf{A} \cap \mathbf{B}$, and find P($\mathbf{A} \cap \mathbf{B}$).**

(d) **Are the events A and B independent? Explain why or why not.**

4.10 Suppose there is a medical screening procedure for a specific cancer that has *sensitivity* = .90, and *specificity* = .95. Suppose the underlying rate of the cancer in the population is .001. Let B be the event "the person has that specific cancer," and let A be the event "the screening procedure gives a positive result."

(a) **What is the probability that a person has the disease given the results of the screening is positive?**

(b) **Does this show that screening is effective in detecting this cancer?**