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**Activity #7: Binomial Random Variables**

**Statistics**

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1. A survey by the American Chemical Society found that 90% of dollar bills in the U.S. are tainted with traces of cocaine. Suppose we select eight dollar bills at random; the number of these bills which are tainted with cocaine can be modeled as a binomial random variable,  $B_n^p$ .
  - (a) Construct a table for the probability distribution of this random variable.
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  - (b) Suppose in our sample of eight bills we find seven with traces of cocaine. Is this an unusually high number?
  
2. A survey found that 48% of U.S. adults use a tax preparer to file their taxes. Suppose we select 20 U.S. adults at random.
  - (a) Find the probability that 12 *or more* of the people in this sample use a tax preparer.
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  - (b) Among 20 U.S. adults, is 12 an unusually large number of people who use a tax preparer?

3. The U.S. Department of Transportation recently reported that 80.5% of flights on U.S. airlines arrived on time. Find the probability that among 12 randomly selected flights, at least 10 arrive on time.
4. A pharmaceutical company regularly receives shipments of 5000 aspirin tablets, and uses the following strategy to either accept a shipment or reject it for failing to meet quality standards: Randomly select and test 40 tablets, and reject the whole batch if either 0 or 1 of them fail to meet the standards.
- (a) A given shipment has a 3% rate of defects. What is the probability that this shipment will be accepted?
- (b) Suppose the tablet supplier uses a production method which has a constant defect rate of 3%. Will almost all shipments be accepted, or will many be rejected?