

### Purchasing Collision Insurance – Part 1: Considering Alternatives

Jee Min is a high school student. He drives his own car to school and work. Jee Min bought a 1998 Chevy Cavalier with a *Kelly Blue Book* value of \$6600. He is looking into purchasing collision insurance. He found a six-month policy with a \$500 deductible per accident and a \$1250 premium for the six months.



1. What do you think is the probability that a teenage male driver will have an accident during any six-month time period? \_\_\_\_\_
2. If Jee Min has an automobile accident, what are the possible damage amounts to his vehicle?  
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3. Suppose Jee Min is legally responsible for an accident and is covered by collision insurance with a \$500 deductible. What would be his out-of-pocket expense if the cost to repair the damage to his car were \$400? \_\_\_\_\_  
What if the cost to repair the damage to his car were \$700? \_\_\_\_\_  
What if the cost to repair the damage to his car were \$1200? \_\_\_\_\_
4. Suppose Jee Min decided to carry collision insurance with a \$500 deductible and had one and only accident during the six-month period with a cost of repair of \$1200. What was Jee Min's total cost for that six-month period? \_\_\_\_\_
5. What would Jee Min's out of pocket cost for an accident be if the other driver were at fault?  
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6. What would Jee Min's out-of-pocket cost be if he purchases the collision insurance described above and does not have an accident? \_\_\_\_\_
7. What would Jee Min's out-of-pocket cost be if he does not have an accident and is not covered by insurance? \_\_\_\_\_
8. Suppose Jee Min does not purchase insurance. What would be his costs for each accident represented in question 3? \_\_\_\_\_

Due to the numerous possible damage amounts, we will investigate Jee Min's insurance problem by placing damage amounts within various ranges. The ranges we will use are:

- a. Damage less than or equal to \$500.
- b. Damage greater than \$500, but less than or equal to \$1000.
- c. Damage greater than \$1000, but less than or equal to one-half the value of the car.
- d. Damage greater than one-half the value of the car, but less than or equal to the total value of the car.

Now we need an estimate of the probability that the damage amount of an accident falls within each range. We will use the following probabilities that are based on data collected by the National Highway Safety Administration.

- Damage less than or equal to \$500: 45%.
- Damage greater than \$500, but less than or equal to \$1000: 15%.
- Damage greater than \$1000, but less than or equal to one-half the value of the car: 25%.
- Damage greater than one-half the value of the car, but less than or equal to the total value of the car: 15%.

Based on other statistics reported by the National Highway Safety Administration, the probability that a teenage driver will have exactly one automobile accident in the next 6 months is 30%.



9. Assuming that Jee Min is a typical driver for his age, what is an appropriate estimate for the probability that he will have an automobile accident in a given six-month period? \_\_\_\_\_

What, then, is the estimated probability that he will not have an automobile accident in a given six-month period? \_\_\_\_\_

10. What two random events must occur in the next six-months in order for Jee Min to have had an accident that incurred collision damage less than or equal to \$500?  
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11. How would you combine the probabilities associated with each of those two random events, in order to determine the probability that in the next six-months Jee Min will have an accident that incurs collision damage less than or equal to \$500? \_\_\_\_\_

12. For each of the ranges listed earlier, use the probabilities provided by the National Highway Safety Administration to estimate the probability that Jee Min will have an automobile accident in the next six months with a damage amount within that range.

- a. Less than or equal to \$500. \_\_\_\_\_
- b. Greater than \$500, and less than or equal to \$1000. \_\_\_\_\_
- c. Greater than \$1000, and less than or equal to half the car's value. \_\_\_\_\_
- d. Greater than half the car's value, and less than or equal to the total value. \_\_\_\_\_

13. Based on these probabilities, would you recommend that Jee Min purchase the collision insurance? \_\_\_\_\_ Explain your response. \_\_\_\_\_

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