

Cumulative Review: Chapters 7 and 8

1. A lottery has sold 5 000 000 tickets at \$1.00 each. The prizes are shown in the table. Determine the expected value per ticket.

Prize	Number of Prizes
\$1 000 000	1
\$50 000	10
\$500	100
\$10	1000

2. The speed limit in a school zone is 40 km/h. A survey of cars passing the school shows that their speeds are normally distributed with a mean of 38 km/h and a standard deviation of 6 km/h.
- What percent of cars passing the school are speeding?
 - If drivers receive speeding tickets for exceeding the posted speed limit by 10%, what is the probability that a driver passing the school will receive a ticket?
3. Determine the probability distribution for the number of heads that you could get if you flipped a coin seven times. Show your results with a table and a graph.
4. Suppose that 82.5% of university students use a personal computer for their studies. If ten students are selected at random, what is
- the probability that exactly five use a personal computer?
 - the probability that at least six use a personal computer?
 - the expected number of students who use a personal computer?
5. Harvinder and Sean work in the quality-control department of a large electronics manufacturer that is having problems with its assembly line for producing CD players. The defective rate on this assembly line has gone up to 12%, and the department head wants to know the probability that a skid of 50 CD players will contain at least 4 defective units. Harvinder uses the binomial distribution to answer this question, while Sean uses the normal approximation. By what percent will Harvinder's answer exceed Sean's?
6. A box contains 15 red, 13 green, and 16 blue light bulbs. Bulbs are randomly selected from this box to replace all the bulbs in a string of 15 lights.
- Design a simulation to estimate the expected number of each colour of light bulb in the string.
 - Calculate the theoretical probability of having exactly 5 red bulbs in the string.
 - What is the expected number of blue bulbs?
 - Would you expect your simulation to produce the same probability as you calculated in part b)? Why or why not?
7. A newspaper poll indicated that 70% of Canadian adults were in favour of the anti-terrorist legislation introduced in 2001. The poll is accurate within $\pm 4\%$, 19 times in 20. Estimate the number of people polled for this survey. Describe any assumptions you make about the sampling procedure.
8. The Ministry of Natural Resources conducted aerial surveys to estimate the number of wolves in Algonquin Park. Aerial surveys of 50 randomly selected 100-km² sections of the park had a mean of 1.67 wolves and a standard deviation of 0.32.
- Determine a 95% confidence interval for the mean number of wolves per 100 km² in the park.
 - Describe any assumptions you made for your calculation in part a).