Exercise Solution

0.1 First part - solution

- **1:** The expected value, EV, of the lottery is equal to the sum of the returns weighted by their probabilities:
$$EV = (0.1)(\$100) + (0.2)(\$50) + (0.7)(\$10) = \$27.$$
- **2:** Personal answer. It has no rational sense to pay a value bigger than the expected value but a lot of people do when they play the lottery...

0.2 Second part - solution

- **1:** 2^{k+1} dollars, where k is the number of consecutive head tosses
- **2:** $E = \frac{1}{2} \cdot 2 + \frac{1}{4} \cdot 4 + \frac{1}{8} \cdot 8 + \frac{1}{16} \cdot 16 + \cdots = 1 + 1 + 1 + 1 + \cdots = \infty$
- **3:** Personal answer. It is supposed no as the answer.
- **4:** $L(W) = log_2(W)$
- **5:** The generic formula given a max number of coin tosses is: $E = \sum_{k=1}^{L+1} p_k 2^{k-1}$. $L(64) = 6$
- **6:** $L(1075000000) = 30$
- **7:** Personal answer.
- **8:** The maximum premium increase exponentially while the average premium increase logarithmically with respect to **W**