   (a) $X$ the result of a die roll.
   (b) $Y$ the height in inches of a randomly chosen Calvin student.
   (c) $Z$ returns on a life insurance policy (5 years, 50 year old male)

2. Probability models - the probability mass function.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$P(X=x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/6</td>
</tr>
<tr>
<td>2</td>
<td>1/6</td>
</tr>
<tr>
<td>3</td>
<td>1/6</td>
</tr>
<tr>
<td>4</td>
<td>1/6</td>
</tr>
<tr>
<td>5</td>
<td>1/6</td>
</tr>
<tr>
<td>6</td>
<td>1/6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$z$</th>
<th>$P(Z=z)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000</td>
<td>.03</td>
</tr>
<tr>
<td>-3,500</td>
<td>.97</td>
</tr>
</tbody>
</table>

3. The mean ($\mu$), variance ($\sigma^2$), and standard deviation ($\sigma$) of a random variable.

$$\mu = \sum x P(X=x)$$

$$\sigma^2 = \sum (x - \mu)^2 P(X=x)$$

$$\sigma = \sqrt{\sigma^2}$$

4. Alternate notation: $E(X)$, Var($X$)

5. Combining of random variables.
   (a) $E(X + Y) = E(X) + E(Y)$.
   (b) If $X$ and $Y$ are independent, $\text{Var}(X + Y) = \text{Var}(X) + \text{Var}(Y)$.
   (c) $E(cX) = cE(X)$.
   (d) $\text{Var}(cX) = c^2 \text{Var}(X)$.

---

**Homework**

1. Read Chapter 16, pages 390–400.

2. Practice problems (due Thursday, March 11) 16.1,3,15,23

3. Problems to turn in (Due Friday, March 12): 16.2a,10a,32
Notes on in-class portion of Test II

Problem 3:

Problem 5:
(a) Remember that the line of best fit is a model and not a deterministic relationship.

\[ \text{Ohms} = 7519 - 90 \text{ Juice} \]

(c) Remember that positive numbers have two square roots. In this case, correlation is negative.

Problem 7:
(d) Do not use the language of sampling to describe an experiment. There is no population here and no random samples. We randomize to attempt to make the two groups similar one to another in all ways except the treatment.

Problem 8:
A parameter is a number (that is unknown). A statistic is a number that is known (8% in this story). In particular, a movie is not a parameter.

Problem 9:
This relationship is not linear. One way to see why it couldn’t be is to realize that life expectancy has a ceiling value that is independent of television.