1. Question 6
   1) y is a vector containing 50 numbers.
   2) \( m_1 = \text{mean}(y) = np = 25 \times 4/10 = 10 \)
   3) \( m_2 = \frac{\text{sum}(y)}{25} = 10 \times 50/25 = 20 \)
   4) Sue was trying to study the variance.

2. Question 27
   1) True
   2) True
   3) True
   4) False (Height can be regarded as one of the traits that can be inherited genetically and hence the heights of a mother-daughter pair need not be independent)

3. Question 30
   1) Let \( R \) denote the response from a participant. Let \( A = 1 \) denote the event that the participant answers to the first question and \( A = 2 \) denote the event that the participant answers the second question. Then we have,
      \[
P(R = Y es) = P(R = Y es \mid A = 1)P(A = 1) + P(R = Y es \mid A = 2)P(A = 2)
\]
   We know that \( P(A=1) = P(A=2) = \frac{1}{2} \) since the question to be answered is selected randomly. Hence
   \[
P(R = Y es) = \frac{1}{2} + \frac{1}{2}p
\]
   \[
\Rightarrow p/2 + 1/4
\]
   2) we just calculated that the probability of getting a Yes response from an arbitrary participant to be \( (p/2 + 1/4) \) and since we are asking 100 participants (\( \equiv 100 \) independent trials with success probability \( p \)) we get \( X \), the number of yes responses to be
   \[
X \sim Bin(100, p/2 + 1/4)
\]

4. Question 32
   Let the random variable \( X \) denote the IQ of a person from Group A, and \( Y \) denote the same for Group B. Then we have
   \[
X \sim N(100, 10)
\]
   \[
Y \sim N(105, 10)
\]
The question asks to find

\[ P(X > Y) \equiv P(X - Y > 0) \]

\[ = \frac{1}{\sqrt{2\pi}10} \frac{1}{\sqrt{2\pi}10} \int_{-\infty}^{\infty} \int_{-\infty}^{x} e^{-\frac{1}{2} \left( \frac{(x-100)^2}{100} + \frac{(y-105)^2}{100} \right)} dy \, dx \]