1-5. Events A, B are said to have $P(A) = 0.7$, $P(B) = 0.4$.

1. If $P(B | A) = 0.2$ then $P(A \cap B) = 0.7 \cdot 0.2 = 0.14$.
   a) 0.28 b) 1.1 c) 0.14 d) 0.96 e) 0.4

2. If A, B are independent then $P(B | A) = \frac{P(B \cap A)}{P(A)}$.
   a) 0.14 b) 0.28 c) 0.96 d) 0.4 e) 1.1

3. If $P(A \cap B) = 0.2$ then $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
   a) 1.1 b) 0.28 c) 0.4 d) 0.96 e) 0.9

4. If $P(A \cap B) = 0.3$ then $P(B | A) = \frac{P(A \cap B)}{P(A)}$.
   a) 0.43 b) 0.4 c) 0.14 d) 0.96 e) 0.28

5. If $P(A \cap B) = 0.3$ then $P(A \cap B^c) = 0.2$.
   a) 0.2 b) 0.1 c) 0.4 d) 0.7 e) 0.6

6. $P(\text{OIL} | A) = \frac{0.2}{0.4} = 0.5$.

7. $P(\text{OIL} \cap +) = 0.7 \cdot 0.2 = 0.14$.
   a) 0.7 b) 0.28 c) 0.25 d) 0.07 e) 0.01

8. $P(\text{OIL} | +) = \frac{P(\text{OIL} \cap +)}{P(\text{OIL})}$.
   a) 0.7 b) 0.28 c) 0.25 d) 0.07 e) 0.01

9. $P(\text{OIL} | +) = \frac{P(\text{OIL} \cap +)}{P(\text{OIL})}$.
   a) 0.7 b) 0.28 c) 0.25 d) 0.07 e) 0.01

10. Suppose that: Cost to test is 50.
    Cost to drill is 100.
    Gross return from drilling for oil, when it is present is 1200.

For the contingency table - determine the net return from the policy:
"Test, but only drill if the test is +".
   a) -150 b) 1150 c) -650 d) -250 e) 550

11-13. A random variable $X$ has the following probability distribution:

<table>
<thead>
<tr>
<th>$X$</th>
<th>$p(X)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>3</td>
<td>0.1</td>
</tr>
</tbody>
</table>

12. $E[X] = \sum X p(X) = 0.5 \cdot 1 + 1.4 \cdot 0.4 = 0.9$

13. Variance $X = E[X^2] - (E[X])^2 = 2 - 0.9^2 = 1.36$

14-16. One play of a lottery has random return $Y$ with:

E $Y = 3$

Variance $Y = 4$ (so standard deviation $= 2$).

14. Determine the expected total return from 100 independent plays.
   e) 400 b) 20 c) 0.03 d) 200 e) 300
   \[ 100 \cdot E[Y] = 300 \]

15. Determine the variance of the total return from 100 independent plays.
   a) 400 b) 20 c) 0.03 d) 200 e) 300
   \[ \text{Variance} E[Y] = 900 \]

16. The probability distribution of the total return from 100 independent plays is approximated by a bell curve. What are the mean and standard deviation (not variance) of this bell curve?
   a) (300, 20) b) (400, 200) c) (0.03, 20) d) (300, 200) e) none of the others

\[ SD = \sqrt{900} = 30 \]

17. (unrelated to above) Here is a sketch of a bell curve with mean 20 and standard deviation 4.
What is the approximate probability of the interval [20-4, 20+4]?
Use the rule of thumb given in lecture for the probability captured by any bell curve within one standard deviation of its mean.

\[ \approx 0.68 \text{ for mean } + 1 \text{ SD.} \]

\[ \approx 0.95 \text{ for mean } + 2 \text{ SD.} \]