1. a) cluster sampling  b) systematic sampling
2. -2*0.19+1*0.01+0*0.35+1*0.41+2*0.04 = 0.10
3. (-1.35)*231.4+1503.8 = 1191.41
4. Q1=23 Q2=29 Q3=39
5. 1/146,107,962
6. (5/12)*(4/11)*(3/10) = 1/22 = 0.0454545
7. normalcdf(96.22,E99,96,0.5/Sqrt(40)) = 0.0027
8. Binomcdf(4,0.96,2) = 0.0091
9. 1-poissoncdf(3,5) = 1-0.9161 = 0.0839
10. The correct answer is 0.32 (rounded from 0.3175).

\[
P(\text{Voter lives in state B} | \text{Voter supports liberal candidate}) = \]
\[
\frac{P(\text{Voter supports liberal candidate} | \text{Voter lives in state B})P(\text{Voter lives in state B})}{\text{P(\text{Voter supports lib. cand.} | \text{Voter lives in state A})P(\text{Voter lives in state A})} + \text{P(\text{Voter supports lib. cand.} | \text{Voter lives in state B})P(\text{Voter lives in state B})} + \text{P(\text{Voter supports lib. cand.} | \text{Voter lives in state C})P(\text{Voter lives in state C})}}
\]
\[
= (0.60)*(0.25)/(0.50)*(0.40) + (0.60)*(0.25) + (0.35)*(0.35)
\]
\[
= (0.15)/(0.20 + 0.15 + 0.1225) = 0.15/0.4725 = 0.3175.
\]

11. Maria has just landed a new job. She will drive I-75 to work every week day. Maria always drives 10 miles over the speed limit. If the probability is .05 that Maria will be caught speeding on any given day, what is the probability that Maria will get caught for the first time on her fourth day driving? Give your answer to four decimal places.
Solution: Geometric distribution. G(4:.05) = (.05)(1-.05)^4-1 = .0429

12. Suppose the age distribution of the Floridian population and the age distribution of a random sample of 438 residents in Fort Myers are shown below.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Percent of Floridian Population</th>
<th>Observed Number in Ft. Myers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5</td>
<td>7.8%</td>
<td>27</td>
</tr>
<tr>
<td>5 to 14</td>
<td>13.3%</td>
<td>59</td>
</tr>
<tr>
<td>15 to 64</td>
<td>67.3%</td>
<td>311</td>
</tr>
<tr>
<td>65 and older</td>
<td>11.6%</td>
<td>41</td>
</tr>
</tbody>
</table>

Find the value of the chi-square statistic for the sample.
Answer = 4.298
13. Suppose a random sample of 328 married couples found that 215 had two or more personality preferences in common. In another random sample of 434 married couples, it was found that only 35 had no preferences in common. Let \( p_1 \) be the population proportion of all married couples who have two or more personality preferences in common. Let \( p_2 \) be the population proportion of all married couples who have no personality preferences in common. Find a 90\% confidence interval for \( p_1 - p_2 \)

Answer = 0.527 to 0.623

14. A utility company offers a lifeline rate to any household whose electricity usage falls below 240 kWh during a particular month. Let \( A \) denote the event that a randomly selected household in a certain community does not exceed the lifeline usage during January, and let \( B \) be the analogous event for the month of July (\( A \) and \( B \) refer to the same household). Suppose \( P(A) = .8 \), \( P(B) = .7 \), and \( P(A \cup B) = .9 \). Compute \( P(A \cap B) \).

Answer: \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \), so \( P(A \cap B) = P(A) + P(B) - P(A \cup B) = .8 + .7 - .9 = .6 \)

15. Twenty-five percent of all telephones of a certain type are submitted for service while under warranty. Of these, 60\% can be repaired whereas the other 40\% must be replaced with new units. If a company purchases ten of these telephones, what is the probability that exactly two will end up being replaced under warranty?

**Answer:**

Let \( S \) represent a telephone that is submitted for service while under warranty and must be replaced. Then \( p = P(S) = P(\text{replaced} \mid \text{submitted}) \cdot P(\text{submitted}) = (.40)(.25) = .10 \). Thus, \( X \), the number among the company’s 10 phones that must be replaced, has a binomial distribution with

\[
N = 10, \ p = .1 \ \binom{2}{1}(.1^2)(.9^8) = .1937 \text{ or } \text{binompdf}(10,.1,2) = .1937
\]