(1) **NORMAL DISTRIBUTION:** $\mu = 86.41$, $\sigma = 7.92$

(a) $P(\ X > 88.00) =$ \text{normalcdf}(88.00, 1E99, 86.41, 7.92) = 0.420

(b) $P(\overline{X} > 88.00) =$ \text{normalcdf}(88.00, 1E99, 86.41, \frac{7.92}{\sqrt{50}}) = 0.078

(c) $P_{10}$ is 10\textsuperscript{th} percentile

\[ X = \text{invNorm}(0.10, 86.41, 7.92) = 76.26 \]

(d) Top 5\% is 95\textsuperscript{th} percentile

\[ X = \text{invNorm}(0.95, 86.41, 7.92) = 99.44 \]
(2) Reconstructed \( x: 33, 45, 46, 47, 51, 52, 55, 58, 63, 64, 71 \)

(a) \( \bar{x} = \frac{\sum x}{n} \)

\[ \bar{x} = \frac{636}{12} = 53 \]

(b) \( s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} \)

\[ s = \sqrt{\frac{1132}{11}} = 10.1 \]

(c) \( s^2 = \left( \sqrt{\frac{1132}{11}} \right)^2 = \frac{1132}{11} = 102.9 \)

(d) \( \sqrt[n]{x} = \frac{x_1 + x_2}{2} = 51.5 \)

(e) \( \text{Mid-range} = \frac{\text{max} + \text{min}}{2} = \frac{71 + 33}{2} = 52 \)
(3) (a)  | Lower Class Boundary | Lower Class Limit | Upper Class Boundary | Upper Class Limit | Class Center | Freq | Rel Freq | Cum Freq |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>32.5</td>
<td>33 - 40</td>
<td>40.5</td>
<td>46.5</td>
<td>36.5</td>
<td>1</td>
<td>1/2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>40.5</td>
<td>41 - 48</td>
<td>48.5</td>
<td>44.5</td>
<td>41.5</td>
<td>3</td>
<td>3/2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>48.5</td>
<td>49 - 56</td>
<td>56.5</td>
<td>52.5</td>
<td>49.5</td>
<td>4</td>
<td>4/2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>56.5</td>
<td>57 - 64</td>
<td>64.5</td>
<td>60.5</td>
<td>57.5</td>
<td>3</td>
<td>3/2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>64.5</td>
<td>65 - 72</td>
<td>72.5</td>
<td>68.5</td>
<td>65.5</td>
<td>1</td>
<td>1/2</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

(b) see right two columns above

(c)  

AGES OF GOLF PHYSICIANS  
at Stamford on Wednesdays

(d)
(A) CONSTRUCT A TABLE:

<table>
<thead>
<tr>
<th>GENDER</th>
<th>GRADUATES</th>
<th>NON-GRADUATES</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>FEMALE</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>TOTALS</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
</tbody>
</table>

(a) \[ P(\text{woman}) = \frac{18}{25} = 0.72 \]

(b) \[ P(\text{man or grad}) = P(\text{man}) + P(\text{grad}) - P(\text{man and grad}) \]
\[ = \frac{7}{25} + \frac{9}{25} - \frac{3}{25} = \frac{13}{25} = 0.52 \]

(c) \[ P(\text{woman and woman and woman}) = \frac{18}{25} \cdot \frac{17}{24} \cdot \frac{16}{23} \]
\[ = \frac{204}{575} \approx 0.355 \]

(d) \[ P(\text{grad | man}) = \frac{3}{7} = \frac{3}{25} \approx 0.429 \]
(5) \[
\begin{align*}
\begin{cases}
\frac{v}{F} & n = 15 \\
\frac{X}{1} & T \\
\frac{\text{CONSTANT } p = 0.70}{\text{binomial}}
\end{cases}
\end{align*}
\]

(a) \( P(X \geq 9) = 1 - \text{binomcdf}(15, .7, 8) \approx 0.869 \)

(b) \( P(X = 10) = \text{binompdf}(15, .7, 10) \approx 0.206 \)

(c) \( P(X \leq 8) = \text{binomcdf}(15, .7, 8) \approx 0.131 \)

(d) \( \mu = np \quad \mu = (15)(.7) = 10.5 \)

\( \sigma = \sqrt{npq} \quad \sigma = \sqrt{(15)(.7)(.3)} \approx 1.8 \)

Bounds on usual \( \mu \pm 2\sigma \)

\( 6.95 \leq \text{usual} \leq 14.05 \)

but this is from a discrete dist

\( 7 \leq \text{usual} \leq 14 \)

"...less than 7 people..." means 6 or fewer

\( \boxed{\text{Yes, it would be unusual because 6 or fewer is below the left bound for "usual".}} \)

Another method:

\( P(X \leq 6) = \text{binomcdf}(15, .7, 6) \approx 0.015 \)

\( \boxed{\text{Yes, } P(X \leq 6) \text{ is less than 5%}} \)
(6) (a) \( P(x > 72) = \text{normalcdf}(72, 1699, 69.0, 2.8) \approx 0.141 \)

Now multiply: \((0.141) \times (500)\)

\[ \approx 71 \text{ men} \]

(b) Binomial, use \( \mu = 25 \)

6 \text{ usually} \leq 14

Below 6 and above 14 or (5 and below and 15 and above)

(c) Binomial \( P(x \geq 5) = 1 - \text{binomcdf}(10, 0.37, 4) \)

\[ \approx 0.294 \]

(d) \[
\begin{array}{c|c}
X & P(X) \\
\hline
75,000 & 0.6 \\
-150,000 & 0.3 \\
0 & 0.1 \\
\end{array}
\]

\[ \mu = \sum X \cdot P(X) = 45,000 \\
-45,000 \\
0 \]

\[ \text{HER EXPECTED VALUE (the mean over many trials) is } \mu = 0. \text{ So in the long run she would earn nothing. With a } 30\% \text{ chance of a big loss, and an average gain of 0, HECK NO!} \]

(e) 100 clocks, 12 defective, 88 good

\[ P(\text{good and good and good}) = \frac{88}{100} \cdot \frac{87}{99} \cdot \frac{86}{98} \approx 0.679 \]

(f) \[ Z_{\text{First}} = \frac{80-70}{5} = \frac{10}{5} = 2 \]

\[ Z_{\text{Second}} = \frac{50-40}{8} = \frac{10}{8} = 1.25 \]

First is right most so it is relative high.