Homework #6: Solutions

A) 
\[ C_O = \$5 - \$1 = \$4 \]
\[ C_U = \$12 - \$5 = \$7 \]

Critical ratio = \[ \frac{C_U}{C_O + C_U} = \frac{7}{11} = 0.6363 \]

Hence we should purchase enough to satisfy the demand with a probability of 0.6363. The Optimal Q* is the 63.63 percentile of the demand distribution.

Standardized value \[ z = 0.35 \]
Hence \[ Q^* = 20 \times 0.35 + 100 \]
\[ Q^* = 107 \]

B) 
\[ C_O = \$5 - \$1 = \$4 \]
\[ C_U = \$8 - \$5 = \$3 \]

Critical ratio = \[ \frac{C_U}{C_O + C_U} = \frac{7}{11} = 0.4286 \]

Hence we should purchase enough to satisfy the demand with a probability of 0.4286. The Optimal Q* is the 42.86 percentile of the demand distribution.

Standardized value \[ z = -0.18 \]
Hence \[ Q^* = -20 \times 0.18 + 100 = 96.4 \]
\[ Q^* = 96 \]

C) 
\[ C_O = \$5 - \$1 = \$4 \]
\[ C_U = \$12 - \$5 = \$7 \]

Critical ratio = \[ \frac{C_U}{C_O + C_U} = \frac{7}{11} = 0.6363 \]

Hence we should purchase enough to satisfy the demand with a probability of 0.6363. The Optimal Q* is the 63.63 percentile of the demand distribution.

\[ Q^* = 70 + (0.636363 \times (130 - 70)) = 108.18 \]
\[ Q^* = 108 \]
D)

\[ C_O = \$5 - \$1 = \$4 \]
\[ C_U = \$12 - \$5 = \$7 \]

Critical ratio = \( \frac{C_U}{C_O + C_U} = \frac{7}{11} = 0.6363 \)

Hence we should purchase enough to satisfy the demand with a probability of 0.6363. The Optimal \( Q^* \) is the 63.63 percentile of the demand distribution.

<table>
<thead>
<tr>
<th>Q</th>
<th>( f(Q) )</th>
<th>( F(Q) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>85</td>
<td>0.08</td>
<td>0.13</td>
</tr>
<tr>
<td>90</td>
<td>0.11</td>
<td>0.24</td>
</tr>
<tr>
<td>95</td>
<td>0.17</td>
<td>0.41</td>
</tr>
<tr>
<td>100</td>
<td>0.2</td>
<td>0.61</td>
</tr>
<tr>
<td>105</td>
<td>0.15</td>
<td>0.76</td>
</tr>
<tr>
<td>110</td>
<td>0.1</td>
<td>0.86</td>
</tr>
<tr>
<td>115</td>
<td>0.08</td>
<td>0.94</td>
</tr>
<tr>
<td>120</td>
<td>0.06</td>
<td>1</td>
</tr>
</tbody>
</table>

\( Q^* = 100 \)