MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the Problem.

1) The number of Hamilton circuits in $K_{11}$ is
   A) $11!$
   B) $\frac{11 \times 10}{2}$
   C) $10!$
   D) $11$
   E) None of the above

2) The number of edges in the complete graph with 50 vertices is
   A) $\frac{50 \times 51}{2}$
   B) $49$
   C) $\frac{49 \times 50}{2}$
   D) $50!$
   E) None of the above

3) The following graph

A) has no Hamilton circuit.
B) has several Hamilton circuits, none of which contain the edge BC.
C) has a single Hamilton circuit (and its mirror-image circuit).
D) has several Hamilton circuits, all of which contain the edge AD.
E) None of the above
A garbage truck must pick up garbage at 4 different dump sites (A, B, C, and D) as shown in the graph below, starting and ending at A. The numbers on the edges represent distances (in miles) between locations. The truck driver wants to minimize the total length of the trip.

4) An optimal solution to this problem is given by
   A) A, C, B, D, A.
   B) A, B, D, C, A.
   C) A, D, C, B, A.
   D) A, D, B, C, A.
   E) None of the above

\[
\begin{align*}
A & \rightarrow B & C & \rightarrow D & A \quad 4 + 3 + 10 + 6 = 23 \\
A & \rightarrow B & D & \rightarrow C & A \quad 4 + 2 + 10 + 14 = 30 \\
A & \rightarrow D & B & \rightarrow C & A \quad 6 + 2 + 3 + 14 = 25 \\
A & \rightarrow D & C & \rightarrow B & A
\end{align*}
\]
A traveling salesman's territory consists of the 5 cities shown on the following mileage chart. The salesman must organize a round trip that starts and ends at Louisville (his hometown) and will pass through each of the other 4 cities exactly once.

<table>
<thead>
<tr>
<th></th>
<th>Boston</th>
<th>Buffalo</th>
<th>Chicago</th>
<th>Columbus</th>
<th>Louisville</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston</td>
<td>*</td>
<td>446</td>
<td>963</td>
<td>735</td>
<td>941</td>
</tr>
<tr>
<td>Buffalo</td>
<td>446</td>
<td>*</td>
<td>522</td>
<td>326</td>
<td>532</td>
</tr>
<tr>
<td>Chicago</td>
<td>963</td>
<td>522</td>
<td>*</td>
<td>308</td>
<td>292</td>
</tr>
<tr>
<td>Columbus</td>
<td>735</td>
<td>326</td>
<td>308</td>
<td>*</td>
<td>209</td>
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<tr>
<td>Louisville</td>
<td>941</td>
<td>532</td>
<td>292</td>
<td>209</td>
<td>*</td>
</tr>
</tbody>
</table>

5) The nearest-neighbor algorithm applied to this problem yields the following solution:
A) Louisville, Columbus, Buffalo, Boston, Chicago, Louisville.
B) Louisville, Chicago, Buffalo, Boston, Columbus, Louisville.
C) Louisville, Boston, Buffalo, Chicago, Columbus, Louisville.
D) Louisville, Columbus, Chicago, Buffalo, Boston, Louisville.
E) None of the above

6) The cheapest-link algorithm applied to this problem yields the following solution:
A) Louisville, Columbus, Buffalo, Boston, Chicago, Louisville.
B) Louisville, Chicago, Buffalo, Boston, Columbus, Louisville.
C) Louisville, Boston, Buffalo, Chicago, Columbus, Louisville.
D) Louisville, Columbus, Chicago, Buffalo, Boston, Louisville.
E) None of the above