1) The function is implemented by using a **single** 74LS151 chip:

\[ f(a, b, c, d) = \sum m(0, 2, 3, 7, 11, 14, 15) \]

\[
\begin{array}{cccc}
1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 \\
\end{array}
\]

Then, we convert the subtraction to an addition in the 2’s Complement Binary system:

\[
\begin{aligned}
11001101.1101 & \quad \text{Sign bit} \\
1001.0111 & \quad \text{Sign extension} \\
\hline
? & \quad \text{?}
\end{aligned}
\]

\[
\begin{aligned}
11001101.1101 & \quad \text{?} \\
11111001.0111 & \quad \text{?}
\end{aligned}
\]

Then, we convert the subtraction to an addition in the 2’s Complement Binary system:

\[
\begin{aligned}
11001101.1101 - 11111001.0111 & \quad \text{?} \\
\hline
? & \quad \text{?}
\end{aligned}
\]

\[
\begin{aligned}
11001101.1101 & \quad \text{?} \\
00000110.1000 & \quad \text{?}
\end{aligned}
\]

We added numbers with opposite signs and so there cannot be overflow. That is, the result is correct! We can convert the result to decimal. Since the result is negative, we make it positive first:

\[
(1101010001110) = 00101011.1010
\]

\[
00101011.1010
\]

\[
\begin{array}{cccccc}
2^5 & + & 2^3 & + & 2^1 & + & 2^{-1} + 2^{-3} = 32 + 8 + 2 + 1 + 0.5 + 0.125 = (43.625)_{10} \\
7 & 6 & 5 & 4 & 3 & 2 & 1 & 0 & -1 & -2 & -3 & -4
\end{array}
\]

\[
\Rightarrow (-43.625)_{10}
\]

The result of the addition in terms of Hex digits:

\[
\begin{aligned}
1101 & \quad \text{D} \\
0100 & \quad \text{4} \\
0110 & \quad \text{6}
\end{aligned}
\]

\[
(D4.6)_{\text{Hex}}
\]
3) The machine player strategy does **not** check for code digits and so misses to earn code reward points when the random digit is 9 above.

On the other hand, by chance it earns code reward points when the random digit is 0.

| RD | Displays **before** play | Displays **after** play | D/A | Adjacency | Reward Points (Decimal) | Plays Again?
|----|-------------------------|-------------------------|-----|-----------|-------------------------|-------------
| 5  | 3 2 2 3                 | 3 5 2 3                 | D   | 0         | 5                       | N           |
| 0  | A B C E                 | A B C E                 | A   | 0         | 220                     | N           |
| 9  | 1 3 3 5                 | 9 3 3 5                 | D   | 0         | 9                       | N           |
| 2  | 7 6 5 4                 | 7 6 5 2                 | D   | 0         | 2                       | N           |
| 0  | 2 A A 2                 | 2 A A 2                 | A   | 1         | 20                      | Y           |

The machine player strategy does **not** check for code digits and so misses to earn code reward points when the random digit is 9 above.

On the other hand, by chance it earns code reward points when the random digit is 0.