D) a) \[
\begin{array}{ccc}
\frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\
\frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\
\frac{1}{9} & \frac{1}{9} & \frac{1}{9}
\end{array}
\]

b) Convolution

c) Yes, there is loss of information. So you cannot recreate the original image from the processed image. The reasons are:

i) Assuming we store the mean value at the top-left corner of the 3x3 pixels, the processed image will have dimension of 
\[(\text{original width} - 2) \times (\text{original height} - 2)\]

ii) The operation does NOT form a bijection. For example,

<table>
<thead>
<tr>
<th>original</th>
<th>processed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1 1</td>
<td>1</td>
</tr>
<tr>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>1 1 1</td>
<td></td>
</tr>
</tbody>
</table>

0 0 0 0
0 9 0 0
0 0 0 0
(d) \[ \frac{1}{3} \quad \frac{1}{2} \quad \frac{1}{3} \]
\[ \frac{1}{2} \quad 1 \quad \frac{1}{2} \]
\[ \frac{1}{3} \quad \frac{1}{2} \quad \frac{1}{3} \]

\[ 1 + \frac{4}{6} + \frac{4}{6} = \frac{26}{6} = \frac{13}{3} \]

\[ \frac{1}{3} \times \frac{3}{13} = \frac{1}{13}, \quad \frac{1}{2} \times \frac{2}{13} = \frac{3}{26}, \quad 1 \times \frac{3}{13} = \frac{3}{13} \]

\[ \therefore \quad \text{The weighted mask would be:} \]

\[ \frac{1}{13} \quad \frac{3}{26} \quad \frac{1}{13} \]
\[ \frac{3}{26} \quad \frac{3}{13} \quad \frac{3}{26} \]
\[ \frac{1}{13} \quad \frac{3}{26} \quad \frac{1}{13} \]
\[
\frac{30/72}{1/2} = \frac{h}{d} \quad \Rightarrow \quad \frac{60}{72} = \frac{h}{d} \quad \Rightarrow \quad d = \frac{72}{60} h
\]

\[
\frac{50/72}{1/2} = \frac{h+12.5}{d} \quad \Rightarrow \quad \frac{100}{72} = \frac{h+12.5}{d} \quad \Rightarrow \quad d = \frac{72}{100} h + 9
\]

Solving for \( h \):

\[
\frac{72h}{60} = \frac{72}{100} h + 9
\]

\[
\Rightarrow \quad \frac{2880}{6000} h = 9 \quad \Rightarrow \quad h = 18.75''
\]

\[
\therefore \quad d = \frac{72}{60} (18.75) = 22.5''
\]

\[
\therefore \quad \text{Calculating distance from the center point of the two cameras and the martian:}
\]

\[
\sqrt{22.5^2 + \left(18.75 + \frac{12.5}{2}\right)^2} = \sqrt{22.5^2 + 25^2} \approx 33.634''
\]