1. Let \( \{B^k_i\}^k_{i=0} \) be the usual Bernstein polynomials on \([0, 1]\).
Where does the tensor-product basis function \( B^n_i(u)B^m_j(v) \) attain its maximum? Prove and illustrate.

2. Consider the bilinear patch \( S(u, v) \) on \([0, 1] \times [0, 1]\) with four control points
\[
\begin{pmatrix}
c_{00} & c_{01} \\
c_{10} & c_{11}
\end{pmatrix}
\]
Begin evaluating \( S(u_0, v_0) \) using the de Casteljau algorithm:

a) Execute the algorithm by working on rows, then on the resulting column vector.

b) Execute the algorithm by working on columns first, then on the resulting row vector.

c) Check that the results are identical.

d) What are the new control points for the resulting patches on \([u_0, 1] \times [0, v_0]\) and \([u_0, 1] \times [v_0, 1]\)? Where did they appear in the algorithm?
3. Download the Maple worksheet homework6.mw from our class page. Construct a $C^1$ continuous blending surface $F_1$ connecting two biquadratic patches $F_0$ and $F_2$. $F_0$ is defined on $[0, 1] \times [0, 1]$ with control points

$$
\begin{pmatrix}
0 & 1 & 0 \\
0 & 1 & 0 \\
0 & 1 & 0
\end{pmatrix}.
$$

$F_2$ is defined on $[2, 3] \times [0, 1]$ with control points

$$
\begin{pmatrix}
1 & 1 & 1 \\
2 & 2 & 2 \\
1 & 1 & 1
\end{pmatrix}.
$$

You need to find the blending surface $F_1$. Note that it will have to be a degree (3,2) surface! Illustrate your solution with Maple.