1. Let $P$ be a polynomial of degree 2 on triangle $T = \langle v_1, v_2, v_3 \rangle$. 

\[ P(v) = \sum_{i+j+k=2} c_{ijk} B_{ijk}^2 \]

Let the coefficients of $P$ be as follows: $c_{200} = 2, c_{110} = 1, c_{101} = 1, c_{020} = c_{011} = c_{002} = 0$.

a. Using de Casteljeau algorithm, compute the value of this polynomial at the point $v = (1/4, 1/4, 1/2)$.

b. Using your solution to part (a), list the Bernstein-Bezier coefficients of the same polynomial with respect to triangle $T = \langle v_2, v_3, v \rangle$

2. Write a subroutine which checks whether a point with coordinates $(x, y)$ belongs to the given triangle $T = \langle v_1, v_2, v_3 \rangle$, with vertices $v_i = (x_i, y_i)$ previously assigned. (Include a printout of your program).
3. Using Maple (you may want to "recycle" some of the code from homework6new.mw), graph the surface corresponding to the NURB

\[ S(u, v) = (P_{00}B_0^2(u)B_0^1(v) + P_{20}B_2^2(u)B_0^1(v) + P_{01}B_0^2(u)B_1^1(v) + 
+ P_{21}B_2^2(u)B_1^1(v) + P_{10}B_1^2(u)B_0^1(v) + P_{11}B_1^2(u)B_1^1(v))/D \]

where

\[ D = B_0^2(u)B_0^1(v) + B_2^2(u)B_0^1(v) + B_0^2(u)B_1^1(v) + B_2^2(u)B_1^1(v) \]

, with \( P_{00} = (r, 0, 0), P_{01} = (r, 0, h), P_{20} = (-r, 0, 0), P_{21} = (-r, 0, h), P_{10} = (0, r, 0), P_{11} = (0, r, 0). \)