CS3621 Exercise 5 Solution (Fall 2005)

Problem: Given the following four rows and four columns control points:

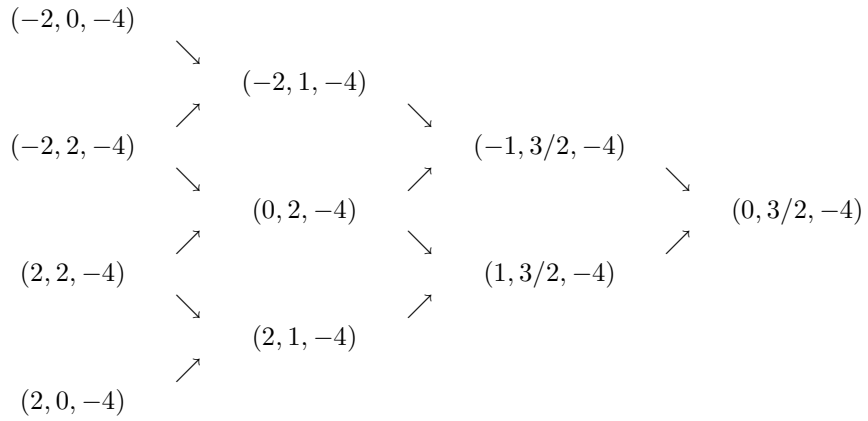
Row 0:	$(-2, 0, -4)$	$(-2, 2, -4)$	$(2, 2, -4)$	$(2, 0, -4)$	on plane $z = -4$
Row 1:	$(-4, 0, -2)$	$(-4, 3, -2)$	$(4, 3, -2)$	$(4, 0, -2)$	on plane $z = -2$
Row 2:	$(-4, 0, 1)$	$(-4, 3, 1)$	$(4, 3, 1)$	$(4, 0, 1)$	on plane $z = 1$
Row 3:	$(-2, 0, 2)$	$(-2, 2, 2)$	$(2, 2, 2)$	$(2, 0, 2)$	on plane $z = 2$

Answer: Compute the corresponding point of (0.2, 0.5) on the Bzier surface defined by the above 44 control points using de Casteljau's algorithm. Here are the control points:

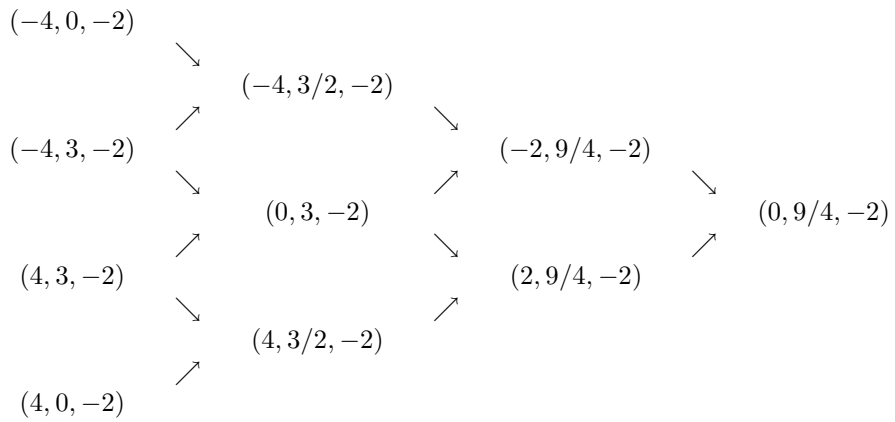
	Column 0	Column 1	Column 2	Column 3
Row 0	(-2,0,-4)	(-2,2,-4)	(2,2,-4)	(2,0,-4)
Row 1	(-4,0,-2)	(-4,3,-2)	(4,3,-2)	(4,0,-2)
Row 2	(-4,0, 1)	(-4,3, 1)	(4,3, 1)	(4,0, 1)
Row 3	(-2,0, 2)	(-2,2, 2)	(2,2, 2)	(2,0, 2)

We also have $u = 0.2$ and $v = 0.5$. Note that v **should be used for rows and** u **should be used for columns**.

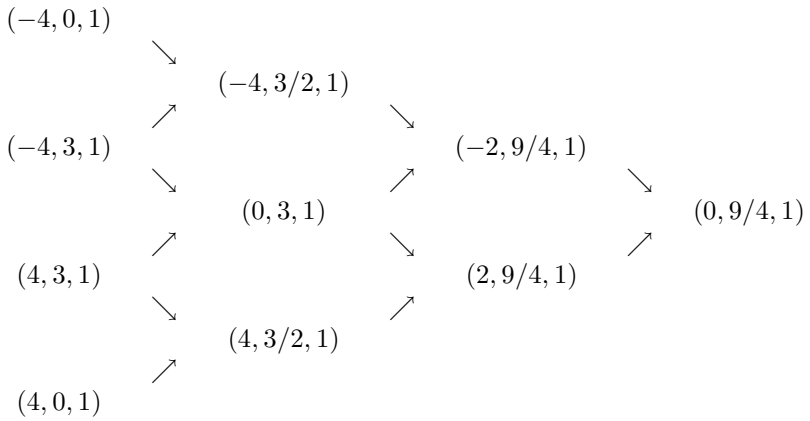
Applying de Casteljau's algorhtm to row 0 with $v = 0.5$ yields



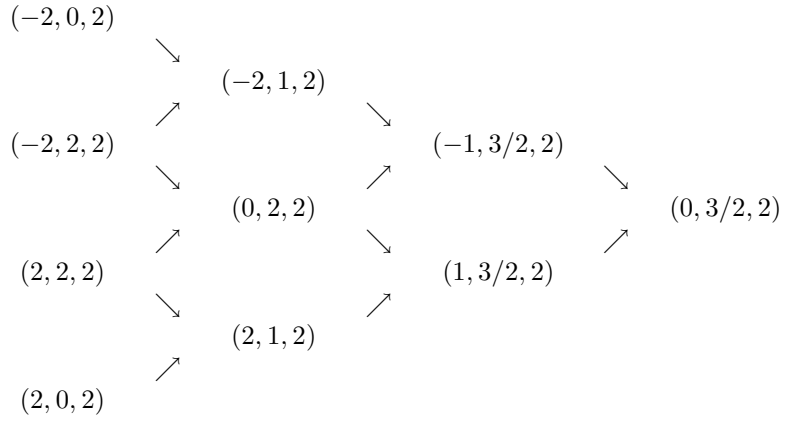
Applying de Casteljau's algorhtm to row 1 with $v = 0.5$ yields



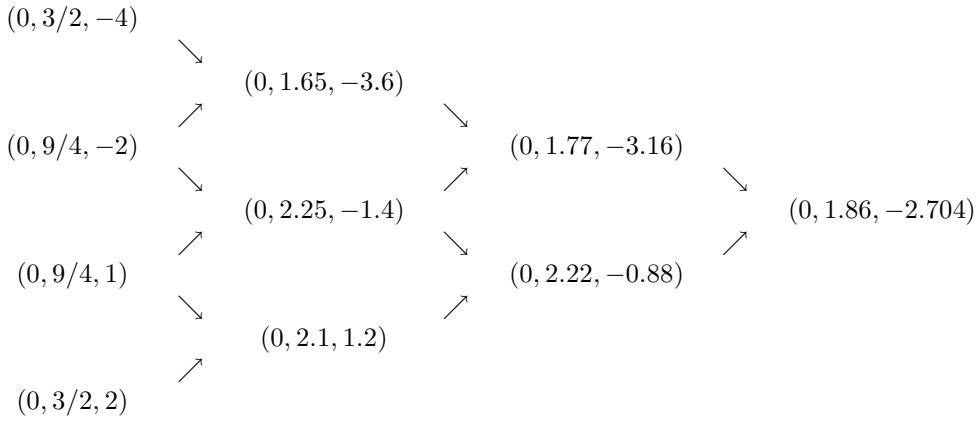
Applying de Casteljau's algorhtm to row 2 with $v = 0.5$ yields



Applying de Casteljau's algorhtm to row 3 with $v = 0.5$ yields



Therefore, the intermediate control points are (0,3/2,-4), (0,9/4,-2), (0,9/4,1) and (0,7/4,2). Applying de Casteljau's algorithm to these intermediate control points (on a column) with $u = 0.2$ yields:



Hence, the point that corresponds to $(0.2, 0.5)$ of the given Bézier surface is (0,1.862,-2.704).