Math 155B - Spring 2020
“Cheat sheet” for Mini-midterm #2 & #3.

This sheet is the ONLY resource you may use for mini-midterm 2 or 3. Do not add other notes to this sheet.

Bézier degree elevation:
\[
\hat{p}_0 = p_0 \quad \hat{p}_{k+1} = p_k \\
\hat{p}_i = \frac{i}{k+1} p_{i-1} + \frac{k-i+1}{k+1} p_i.
\]

Bézier derivative formula:
\[
q'(u) = k \cdot \sum_{i=0}^{k-1} B_i^{k-1}(u)(p_{i+1} - p_i).
\]

Half unit circle as degree two Bézier curve: has control points
\[
p_0 = \langle 0, 1, 1 \rangle, \quad p_1 = \langle 1, 0, 0 \rangle, \quad p_2 = \langle 0, -1, 1 \rangle,
\]

Quarter unit circle as degree two Bézier curve: has control points
\[
p_0 = \langle 0, 1, 1 \rangle, \quad p_1 = \langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \rangle, \quad p_2 = \langle 1, 0, 1 \rangle,
\]

Cox-de Boor formula:
\[
N_{i,k+1}(u) = \frac{u - u_i}{u_{i+k} - u_i} N_{i,k}(u) + \frac{u_{i+k+1} - u}{u_{i+k+1} - u_{i+1}} N_{i+1,k}(u)
\]

Control points for the derivative of a B-spline curve:
\[
p_i^* = \frac{k}{u_{i+k} - u_i} (p_i - p_{i-1})
\]