3 point Bezier curve:

Finding left, right, top, and bottom points:

Points

(x1, y1) (x2, y2) (x3, y3)

1. For min(x) and max(x):

Find: p=x1-x2 q=x1-2\*x2+x3

If q is not 0 then

t = p/q

if 0<=t<=1 then

find three xm points:

xm1 = x1

xm2 = (1-t)^2 \* x1 +2(1-t)t \* x2 +t^2 \*x3

xm3 = x3

// Left

find the minimum of xm1, xm2, and xm3

if xm1 is minimum then t=0

if xm3 is minimum then t=1

left point:

x\_left = (1-t)^2 \* x1 +2(1-t)t \* x2 +t^2 \*x3

y\_left = (1-t)^2 \* y1 +2(1-t)t \* y2 +t^2 \*y3

find the maximum of xm1, xm2, and xm3

if xm1 is maximum then t=0

if xm3 is maximum then t=1

right point:

x\_right = (1-t)^2 \* x1 +2(1-t)t \* x2 +t^2 \*x3

y\_right = (1-t)^2 \* y1 +2(1-t)t \* y2 +t^2 \*y3

else: // if q=0 or t<0 or t>1

compare only x1 and x3, one is the left point and the other is right point

1. For min(y) and max(y)

Find: p=y1-y2 q=y1-2\*y2+y3

If q is not 0 then

t = p/q

if 0<=t<=1 then

find three ym points:

ym1 = y1

ym2 = (1-t)^2 \* y1 +2(1-t)t \* y2 +t^2 \*y3

ym3 = y3

// Bottom

find the minimum of ym1, ym2, and ym3

if ym1 is minimum then t=0

else if ym3 is minimum then t=1

Other wise t=p/q

bottom point:

x\_bottom = (1-t)^2 \* x1 +2(1-t)t \* x2 +t^2 \*x3

y\_bottom = (1-t)^2 \* y1 +2(1-t)t \* y2 +t^2 \*y3

find the maximum of ym1, ym2, and ym3

if ym1 is maximum then t=0

else if ym3 is maximum then t=1

other wise t=p/q

top point:

x\_top = (1-t)^2 \* x1 +2(1-t)t \* x2 +t^2 \*x3

y\_top = (1-t)^2 \* y1 +2(1-t)t \* y2 +t^2 \*y3

else: // if q=0 or t<0 or t>1

compare only y1 and y3, one is the bottom point and the other is top point