function [p q beta] = BetaVec(Fx,a,b,res)

%BETAVEC takes in fitness limit Fx and the beta parameters a and b

%and res (the number of indices in the vectors)

%and finds the vectors p (the area under the distribution) and q

%(the expected F value) for all starting indices corresponding to F values

%from 0 to Fx.

p = zeros(1,res); %The p vector

q = zeros(1,res); %The psi vector

x = 0.5/res:1/res:(res-0.5)/res; %Spacing gets midpoints of 1/res segments

bet = (x.^(a-1)).\*((1-x).^(b-1));%The unnormalized beta vector

summer = 0;

for i = 1:res %Add the areas

summer = summer + bet(i)/res;

end

beta = bet/summer; %Normalize bet to get the beta PDF

better = 0; batter = 0;

for i = res:-1:1 %Sum backwards from the end

better = better + beta(i)/res; %Find p for each i

batter = batter + (beta(i)/res)\*(i-0.5)/res; %Find psi for each i

p(i) = better; %p is based on [0 1] xaxis

q(i) = (batter/p(i))\*Fx; %q based on [0 Fx] xaxis

end