Example $\alpha = 3, \beta = 8$

$$F_X(a) = 360 \left(\left(\frac{1}{8} - \frac{2}{9} + \frac{1}{10} \right) - (1-a)^8 \left(\frac{1}{8} - \frac{2}{9}(1-a) + \frac{1}{10}(1-a)^2 \right) \right)$$

$$\underbrace{\phantom{\left(\frac{1}{8} - \frac{2}{9} + \frac{1}{10} \right)}}_{= \frac{1}{360}}$$

$$= 1 - 360(1-a)^8 \left(\frac{1}{8} - \left(\frac{2}{9} \right)(1-a) + \left(\frac{1}{10} \right)(1-a)^2 \right)$$

E.g. $P(X \leq \frac{1}{2}) = F_X\left(\frac{1}{2} \right) = 1 - 360\left(\frac{1}{2} \right)^8 \left(\frac{1}{8} - \left(\frac{2}{9} \right)\left(\frac{1}{2} \right) + \left(\frac{1}{10} \right)\left(\frac{1}{4} \right) \right)$

$$= 1 - \frac{360}{256} \cdot \frac{7}{180}$$

$$= 1 - \frac{7}{128}$$

$$= \frac{121}{128}$$

What else?

$$E(X) = \frac{3}{3+8} = \frac{3}{11}$$

$$Var(X) = \frac{(3)(8)}{\left((3+8)^2 (3+8+1) \right)} = \frac{2}{121}$$