(13.1) If a and b are positive numbers, find the maximum value of $f(x) = x^a(x-1)^b$, $0 \leq x \leq 1$.

We will complete the first derivative test to find the Critical Points

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(f(x) = x^a(x-1)^b\right) =$$

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(x^a\right)(x-1)^b + \frac{\mathrm{d}}{\mathrm{d}x}\left((x-1)^b\right)x^a =$$

$$(ax^{a-1})(x-1)^b + b(x-1)^{b-1}\frac{\mathrm{d}}{\mathrm{d}x}(x-1)x^a =$$