

3.1 #29

$$\frac{d}{dx} [x^n (3-x)^b] = nx^{n-1} (3-x)^b + x^n (b (3-x)^{b-1} (-1)) \stackrel{\text{SET}}{=} 0$$

$$x^{n-1} (3-x)^{b-1} [n(3-x) - xb] \stackrel{\text{SET}}{=} 0$$

$$\Rightarrow x^{n-1} (3-x)^{b-1} [3n - nx - bx] = 0$$

$$\Rightarrow x=0, 3,$$

$$x^{n-1} (3-x)^{b-1} [-(n+b)x - 3n]$$

$$x=0, 3 \Rightarrow y=0$$

$$x = \frac{3n}{n+b} \Rightarrow \left(\frac{3n}{n+b}\right)^n \left(3 - \frac{3n}{n+b}\right)^b$$

$$= \frac{3^n n^n}{(n+b)^n} \left(\frac{3n+3b-3n}{n+b}\right)^b =$$

$$= \frac{3^n n^n}{(n+b)^n} \left(\frac{+3b}{n+b}\right)^b$$

$$= \frac{3^{b+n} n^n b^b}{(n+b)^{b+n}} = \frac{3^{a+b} a^a b^b}{(a+b)^{a+b}}$$

$n = a$, dummy.

$$3n - nx - bx = 0$$

$$3n - x(n+b) = 0$$

$$x(n+b) = 3n$$

$$0 < x = \frac{3n}{n+b} < \frac{3n}{n} = 3$$