$$\begin{pmatrix} 1 & \cdots & 1 \end{pmatrix} \begin{pmatrix} 1 & & \\ & \ddots & \\ & & 1 \end{pmatrix} \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & \cdots & 1 \end{pmatrix} \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix} = n$$

$$\begin{pmatrix} 1 & & \\ & \ddots & \\ & & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 & 1 & \cdots & 1 \\ \vdots & & & & \\ 1 & \cdots & & & 1 \end{pmatrix} \begin{pmatrix} 1 & & \\ & \ddots & \\ & & 1 \end{pmatrix}$$

$$= 1_n 1_n^T$$

$$\frac{1 - p + np}{1 - p} = \frac{1 - p(1 - n)}{1 - p}$$

$$= \frac{1 + p(n-1)}{1-p}$$

$$\frac{p}{1+(n-1)p} \in (0,1)$$

$$0 \le \frac{-p}{1+(n-1)p} \le 1$$

$$0 \le -p \le 1+(n-1)p$$

$$0 \le -p-(n-1)p \le 1$$

$$0 \le p(-1-(n-1)) \le 1$$

$$0 \le p(\cancel{-1} - n \cancel{+1}) \le 1$$

$$0 \le -pn \le 1$$

$$0 \ge$$

$$|R(p)| > 0 \quad (p.d.)$$

$$(1-p)^{n-1}\left(1+(n-1)p\right) > 0$$

$$1+(n-1)p > 0$$

$$p > \frac{-1}{n-1}$$

$$\left(1 - \frac{n\theta - 1}{n-1}\right)^{n-1}\left(1 + \left(\frac{n\theta - 1}{n-1}\right)n-1\right)$$

$$= \left(\frac{n-1-n\theta+1}{n-1}\right)^{n-1}\left(1 + n\theta - 1\right)$$

$$= \left(\frac{n(1-\theta)}{n-1}\right)^{n-1} n\theta$$

$$\propto (1-\theta)^{n-1}\theta$$