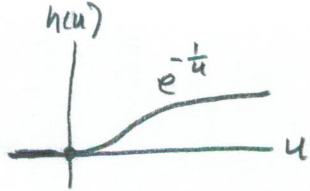
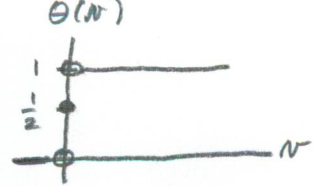
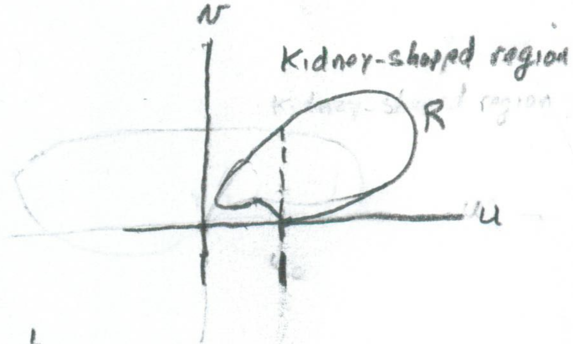
[10.15] $\Phi(u, v) = \Theta(v)\, h(u)$




Consider $\Phi$ on open kidney-shaped region R shown in $(u, v)$-plane

in open 1st-quadrant of $(u, v)$ plane,




$$\frac{\partial \Phi(u,v)}{\partial v} = \frac{\partial}{\partial v}\left[\Theta(v)\, h(u)\right] = h(u)\cancelto{0}{\frac{d\Theta}{dv}} = 0 \checkmark$$

$\Phi(u, v)$ is smooth on R:

$\Theta(v) = 1 \quad \forall (u, v) \in R \Rightarrow \Phi(u, v) = h(u) = e^{-\frac{1}{u}}$ on R ✓

$\Phi$ is not fully consistent on R as a function of $u$:

On the line segment $u = 1$ in R, $\Phi(1, v) = \begin{cases} \frac{1}{e} & \text{for } v > 0 \\ \frac{1}{2e} & \text{for } v = 0 \end{cases}$

So $\Phi$ has a jump discontinuity where R meets $u$-axis. ✓