Wardrop's Principle (Equilibrium): [Also known as User Equilibrium]

↳ the costs of the used routes will be equal and less than or equal to the costs of the unused routes.

[Complementarity Problem]. Note: routes ≡ links

① Demonstrating $x_1 = 0$ and $x_2 = d$ is a UE assignment.

when $x_1 = 0$ $c_1(0) = 1 + \frac{1}{0} = \underline{\underline{\infty}}$ (infinity)

when $x_2 = d$ $c_2(d) = 3 + d = \underline{\underline{3+d}}$

$\therefore$ $\underline{\underline{c_1(0) \geq c_2(d)}}$ and so $x_1 = 0$ and $x_2 = d$ is a UE assignment

② Deriving a condition on d for which $x_1 = d$ and $x_2 = 0$ is also a UE assignment

when $x_1 = d$ $c_1(d) = 1 + \frac{1}{d} = \frac{d+1}{d}$

when $x_2 = 0$ $c_2(0) = 3 + 0 = 3$

$\therefore$ $c_1(d) \leq c_2(0)$

From ① $c_1(0) \geq c_2(d)$ $\Rightarrow$ $\infty \geq 3+d$ → can't use this

From ② $c_1(d) \leq c_2(0)$ $\Rightarrow$ $\frac{d+1}{d} \geq 3$

$d + 1 \geq 3d$

$1 \geq 2d$

$\therefore$ $\underline{\underline{d \leq 1/2}}$