Quiz 27

For the system for competing species

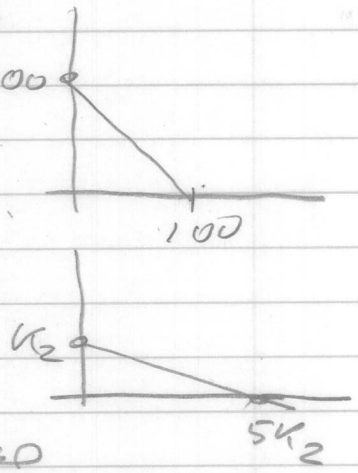
$$\frac{dx}{dt} = r_1 x\left(\frac{100 - x - .5y}{100}\right)$$

$$\frac{dy}{dt} = r_2\left(\frac{K_2 - y - .2x}{K_2}\right)$$

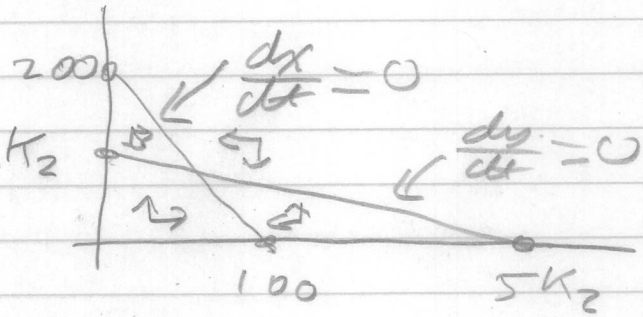
what values of K_2 lead to coexistance.

When $\frac{dx}{dt} = 0$ we have $x = 0$, $x + .5y = 100$
so the intercepts are
$x = 100$, $y = 200$

When $\frac{dy}{dt} = 0$ we have $y = 0$
or $y + .2x = K_2$ which
leads to $y = K_2$, $x = 5K_2$



There is coexistence when these segments cross



This sing $100 < 5K_2$ (i.e $200 < K_2$)
and $K_2 < 200$. So there is
coexistance when

$$\boxed{20 < K_2 < 200}$$