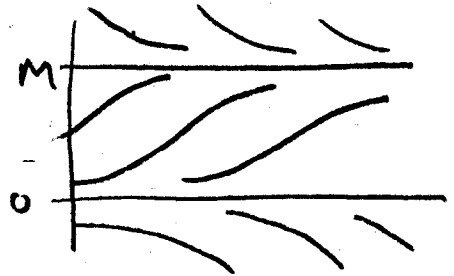


Week 4 summary:

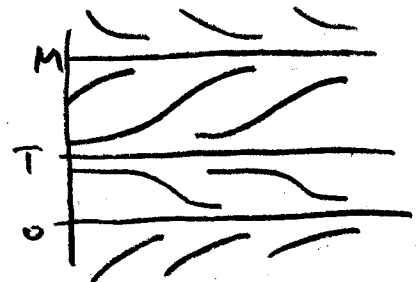
- Logistic equation:  $y' = r y \left(1 - \frac{y}{M}\right)$   

$$y(t) = \frac{M}{1 + C e^{-rt}}$$



Add an "extinction threshold:"

$$y' = -r y \left(1 - \frac{y}{M}\right) \left(1 - \frac{y}{T}\right)$$



- 2<sup>nd</sup> order linear ODEs:  $y'' + p(t)y' + q(t)y = f(t)$ .

Homogeneous if  $f(t) = 0$ .

General solution:  $y(t) = y_h(t) + y_p(t) = C_1 y_1(t) + C_2 y_2(t) + y_p(t)$ .

- Constant coefficients:  $y'' + p y' + q y = 0$

Assume  $y(t) = e^{rt}$ , plug back in and solve for  $r$ .

Get  $e^{rt} (r^2 + pr + q) = 0$ .