Utility function: $u(x_1, x_2)$

$\{x_1^*, x_2^*\}$ is preferred to $\{x_1^{**}, x_2^{**}\}$ $\Leftrightarrow$ $u(x_1^*, x_2^*) > u(x_1^{**}, x_2^{**})$

Indifference curve: combinations of x_1 and x_2 s.t. $u(x_1, x_2) = c$ (for utility c)

Marginal rate of substitution (MRS): slope of IC

Example:

O: #oysters

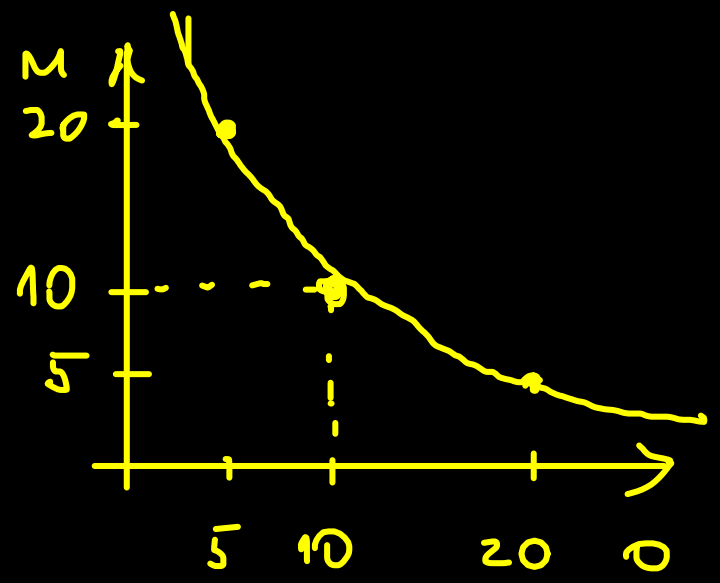
M: #mussels

$u(O, M) = O \times M$

IC for $u = 100$

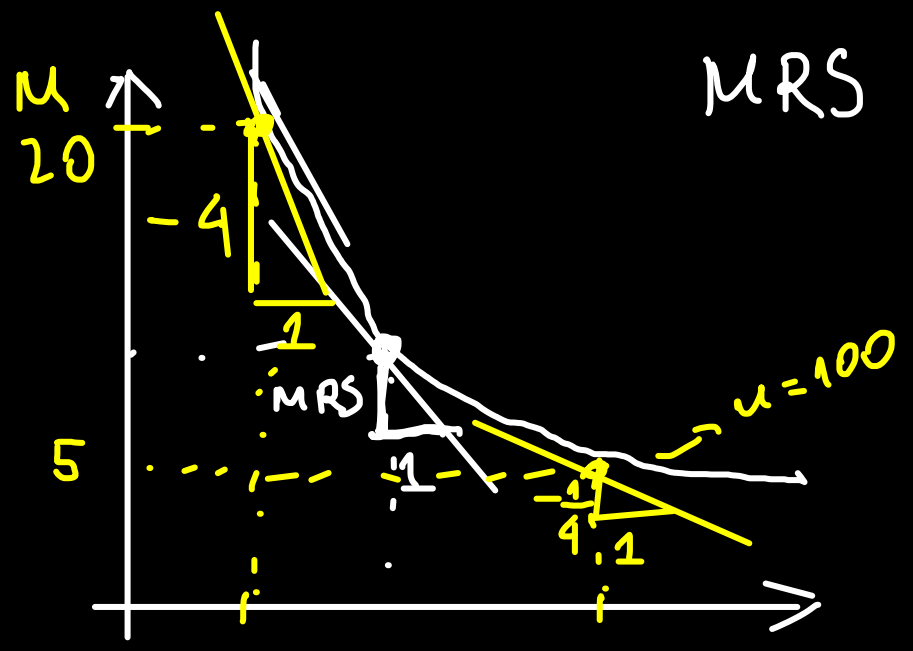
$\{O, M$ s.t. $O \times M = 100\}$

Note: $M = \frac{100}{O}$



Given $u(x_1, x_2)$ and $\{x_1^*, x_2^*\}$ where $u(x_1^*, x_2^*) = c$

$MRS(x_1^*, x_2^*)$ = slope of IC through $\{x_1^*, x_2^*\} = \left.\frac{dx_2}{dx_1}\right|_{u(x_1,x_2)=c}$



$$MRS = -\frac{u_{x_1}(x_1, x_2)}{u_{x_2}(x_1, x_2)} = -\frac{MU_{x_1}}{MU_{x_2}}$$

$u(O, M) = O \times M$

$$MRS = \left.\frac{dM}{dO}\right|_{O \times M = 100} = -\frac{MU_O}{MU_M} = -\frac{M}{O}$$

$$MRS(O=5, M=20) = -\frac{20}{5} = -4$$

$$MRS(O=20, M=5) = -\frac{5}{20} = -\frac{1}{4}$$