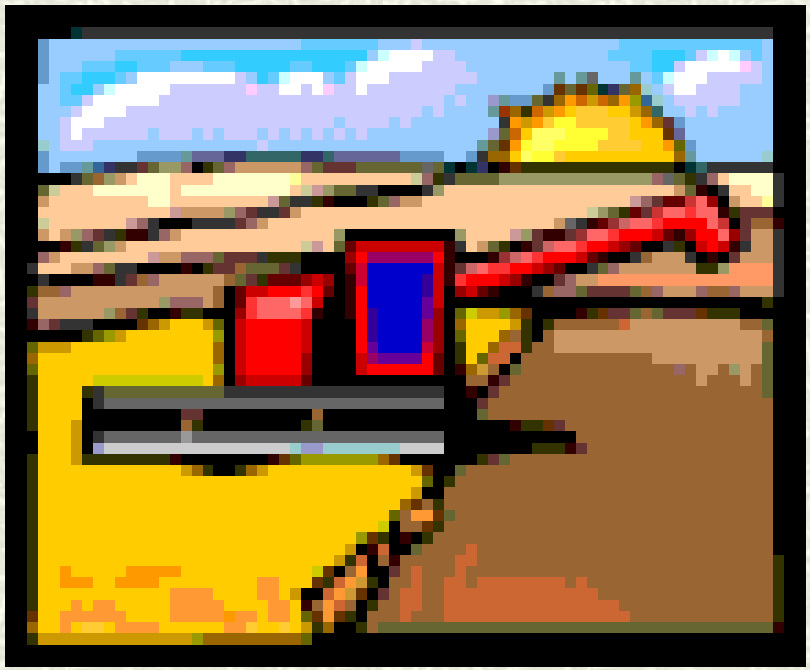
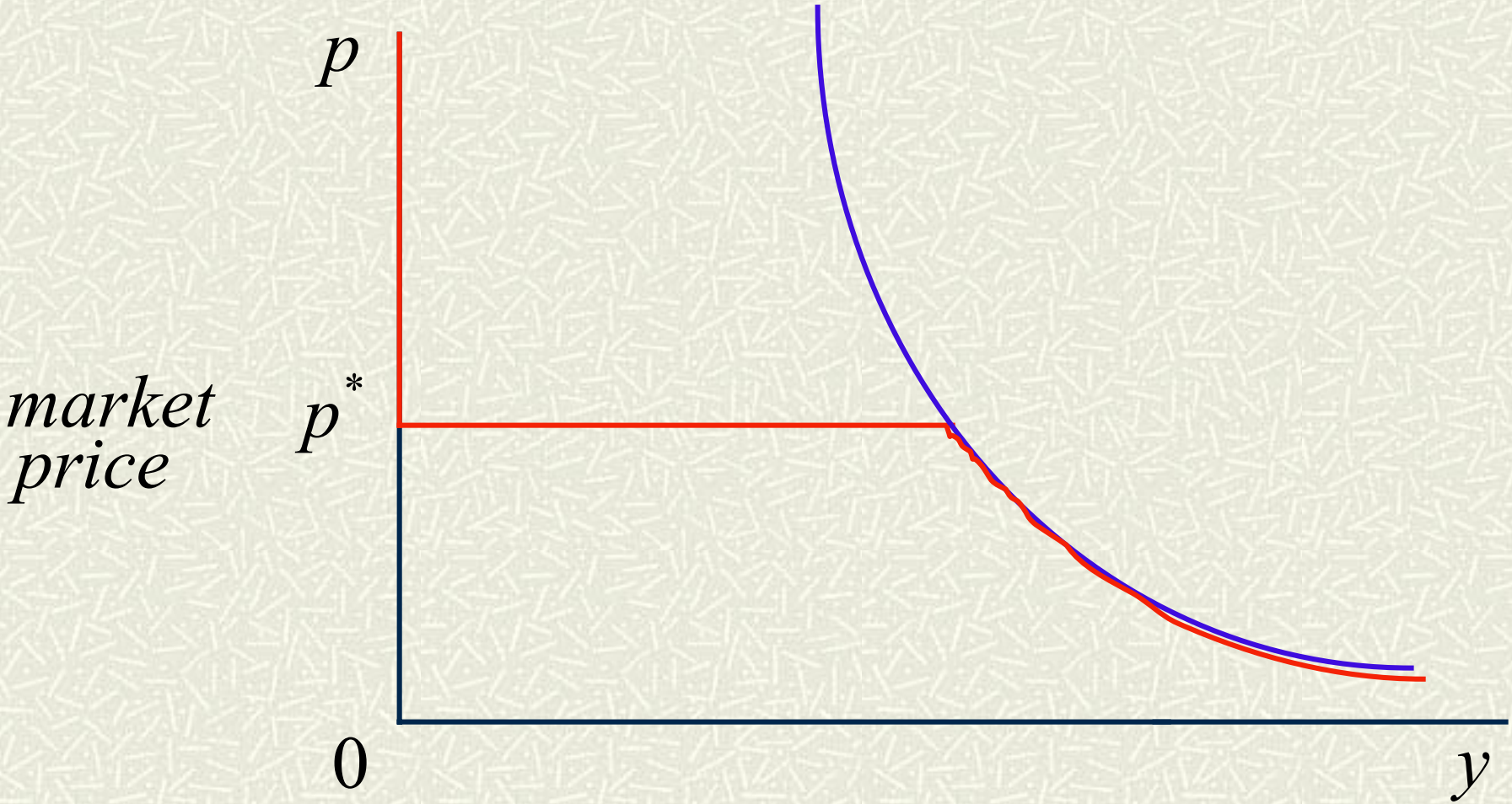
Firm Supply



- Demand Curve Facing Competitive Firm
- Supply Decision of a Competitive Firm
- Producer's Surplus and Profits
- Long-Run

The Demand Curve Facing a Competitive Firm

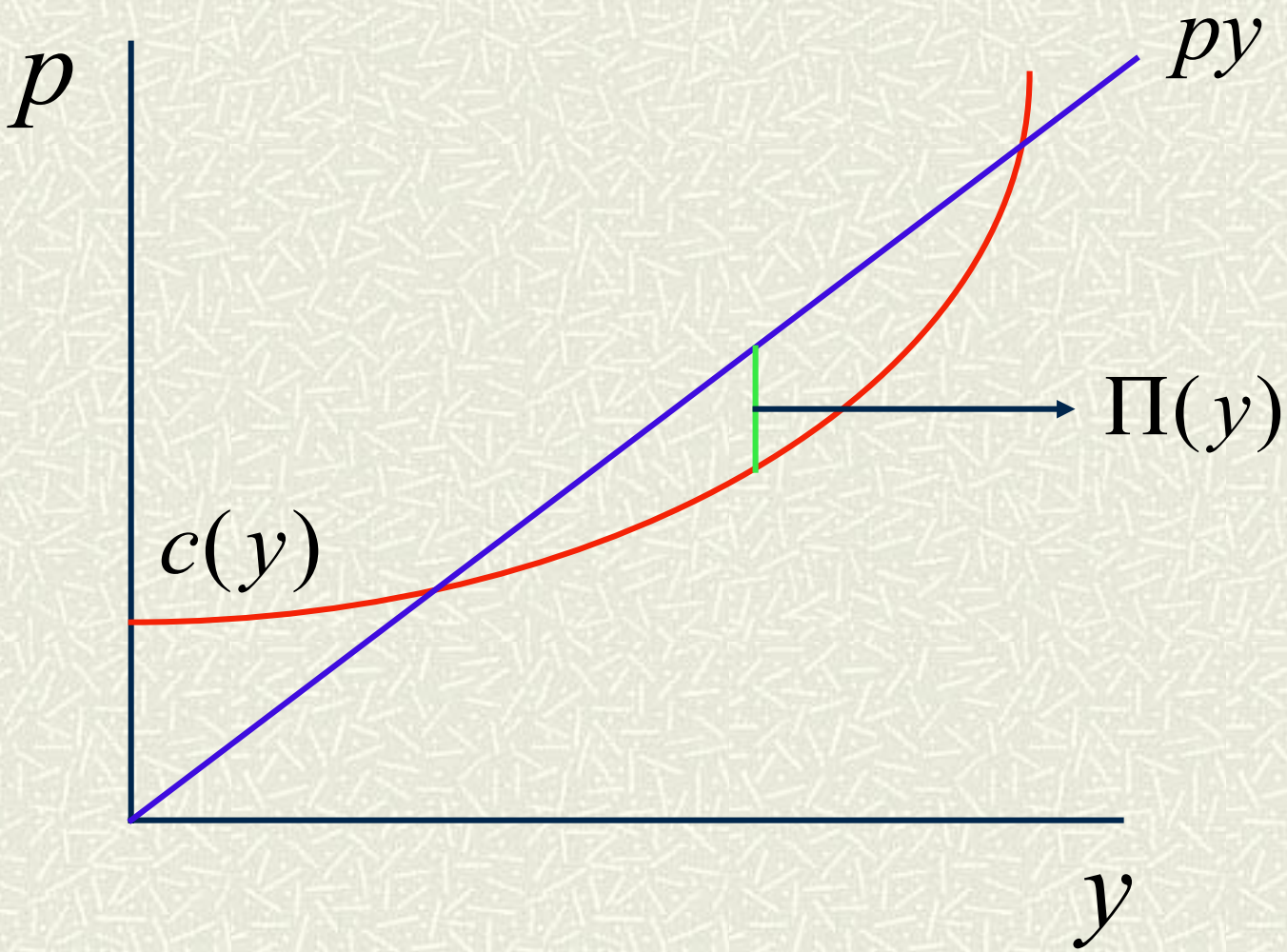


Supply Decision of a Competitive Firm

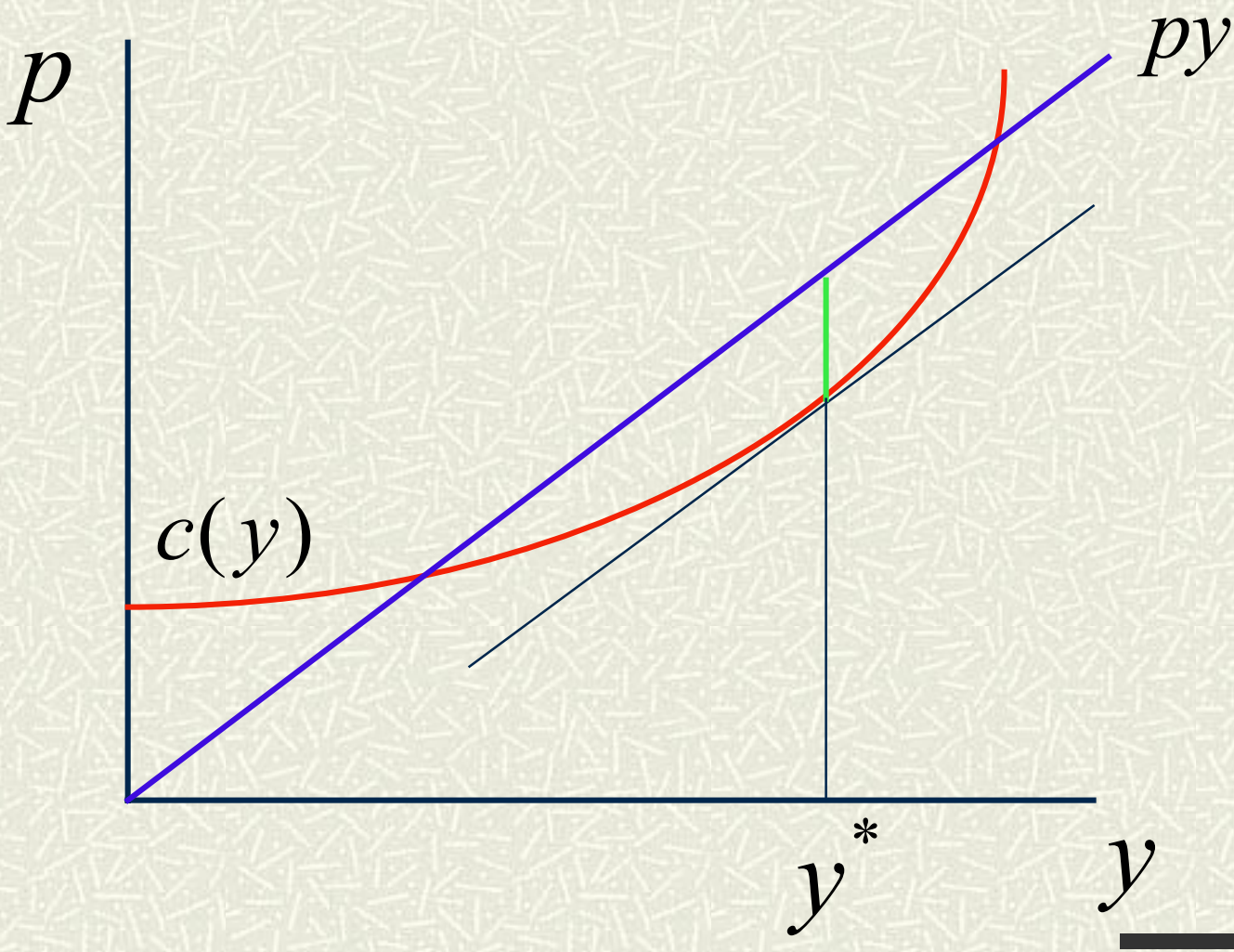
- Problem of a competitive firm:

$$\max_{y} \; py - c(y)$$

Revenues, Costs, and Profits



Maximum Profits



Optimal Quantity Supplied

- Firm maximizes:

$$\max_{y} py - c(y)$$

- **Necessary** condition for optimal choice:

$$p = \frac{\partial c(y)}{\partial y} = MC(y)$$

An Example

- Short-run cost function:

$$c(y) = y^2 + 1$$

- Marginal cost function:

$$MC(y) = 2y$$

An Example

- Average variable costs:

$$AVC(y) = \frac{y^2}{y} = y$$

- Average costs:

$$AC(y) = \frac{y^2}{y} + \frac{1}{y} = y + \frac{1}{y}$$

An Example

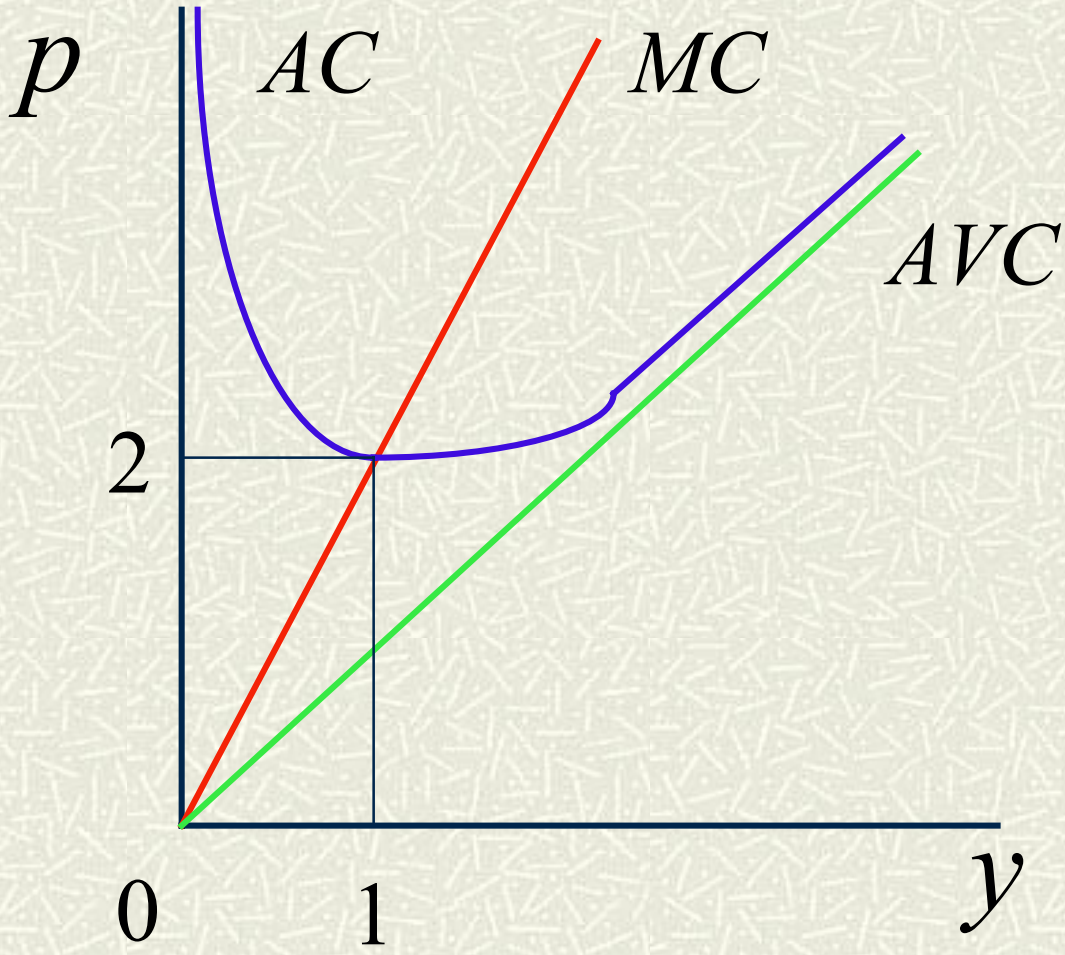
- Profit maximization:

$$\max_{y} py - \left(y^2 + 1\right)$$

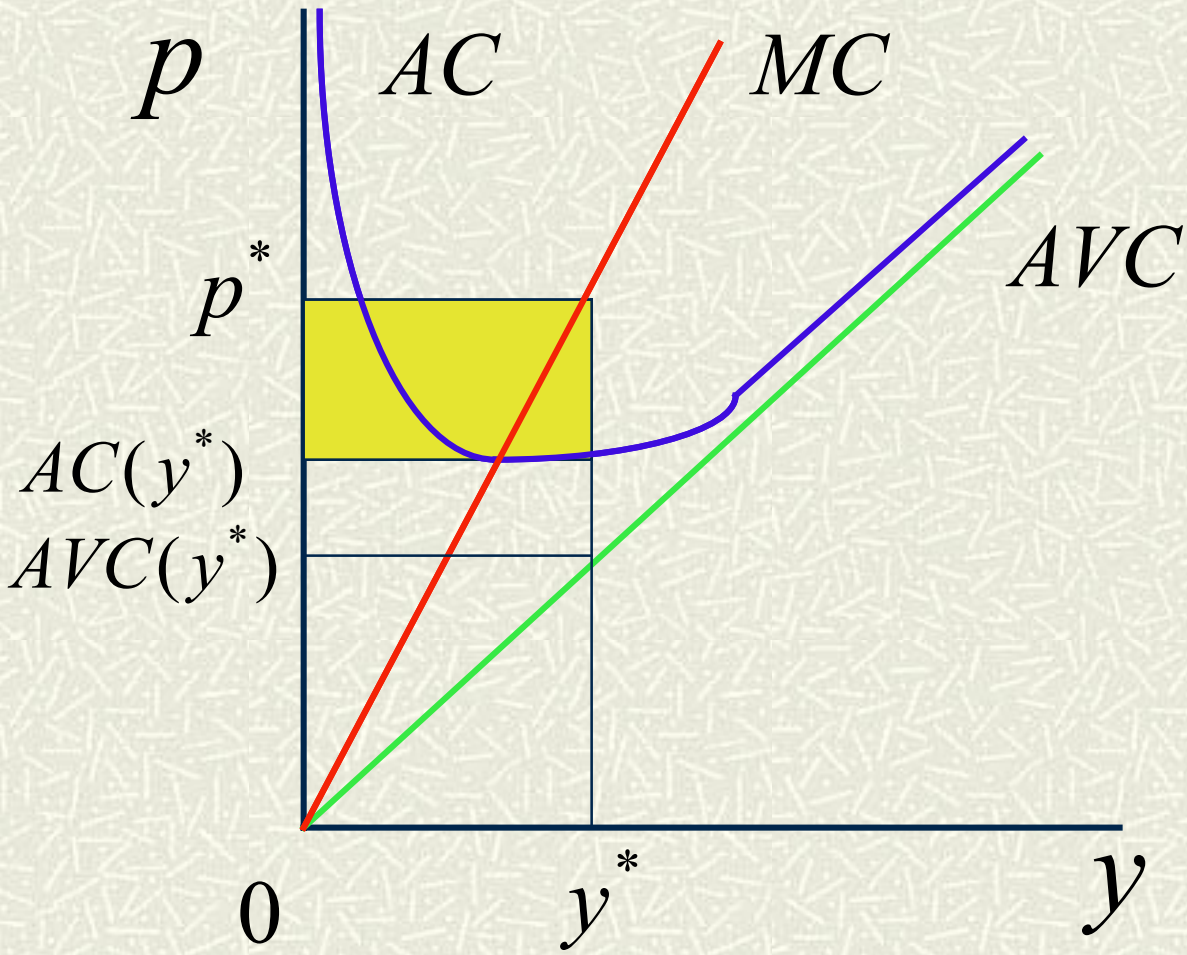
- Necessary condition:

$$p = 2y$$

An Example



An Example: Profits



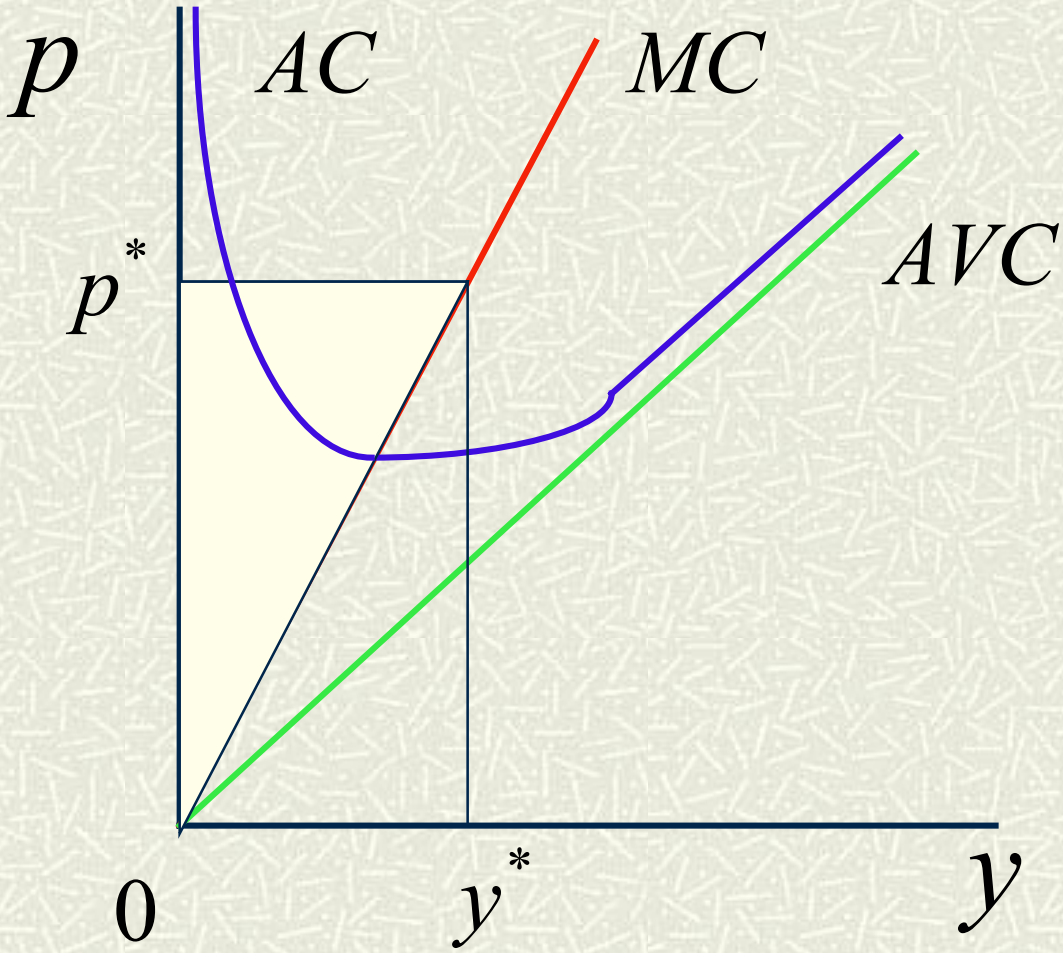
Producer's Surplus

- Producer's surplus=Area below price above supply curve
- Alternatively: $py^* -$ below supply curve

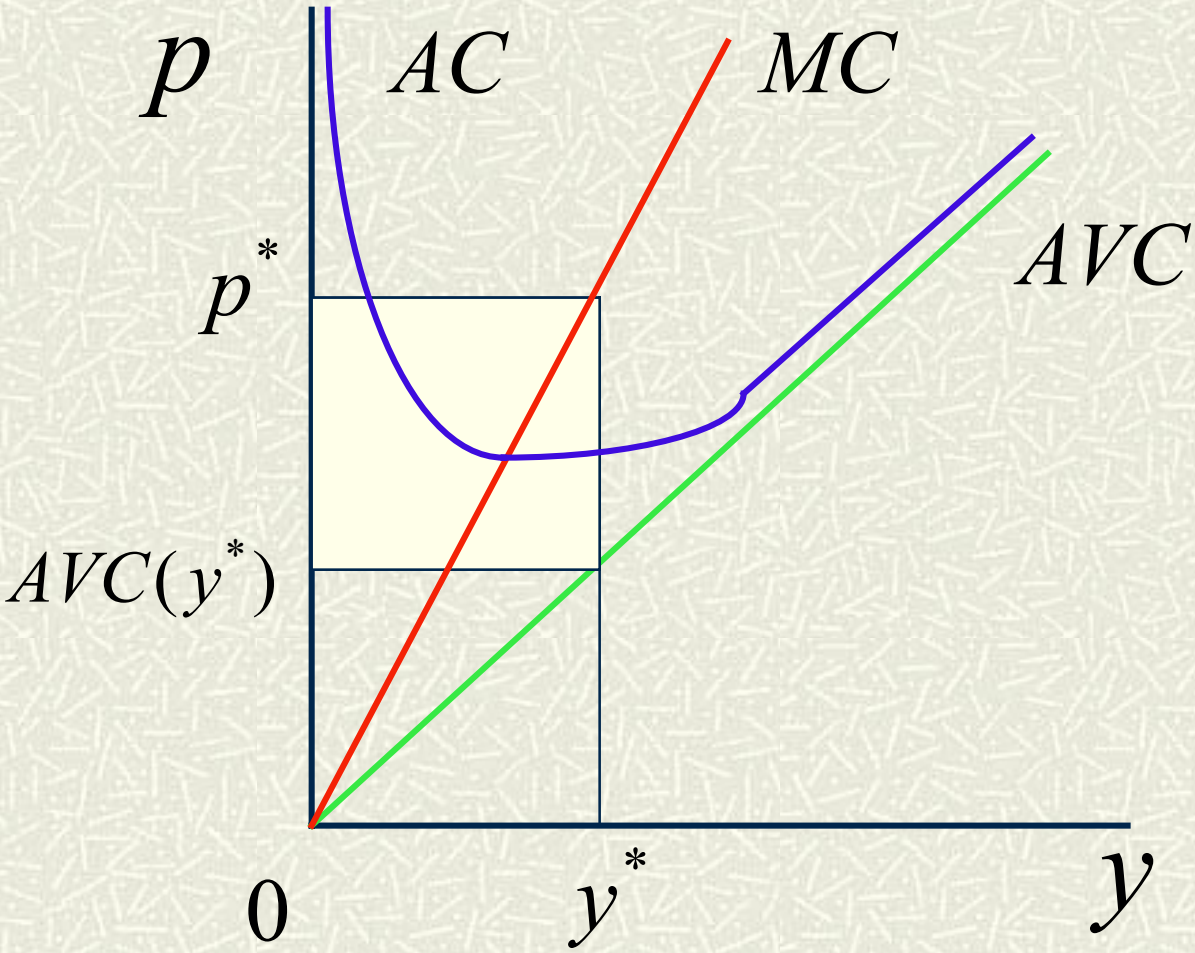
where area below supply curve (MC):

$$c_v(y^*)$$

An Example: Producer's Surplus



An Example: Producer's Surplus



Producer's Surplus and Profits

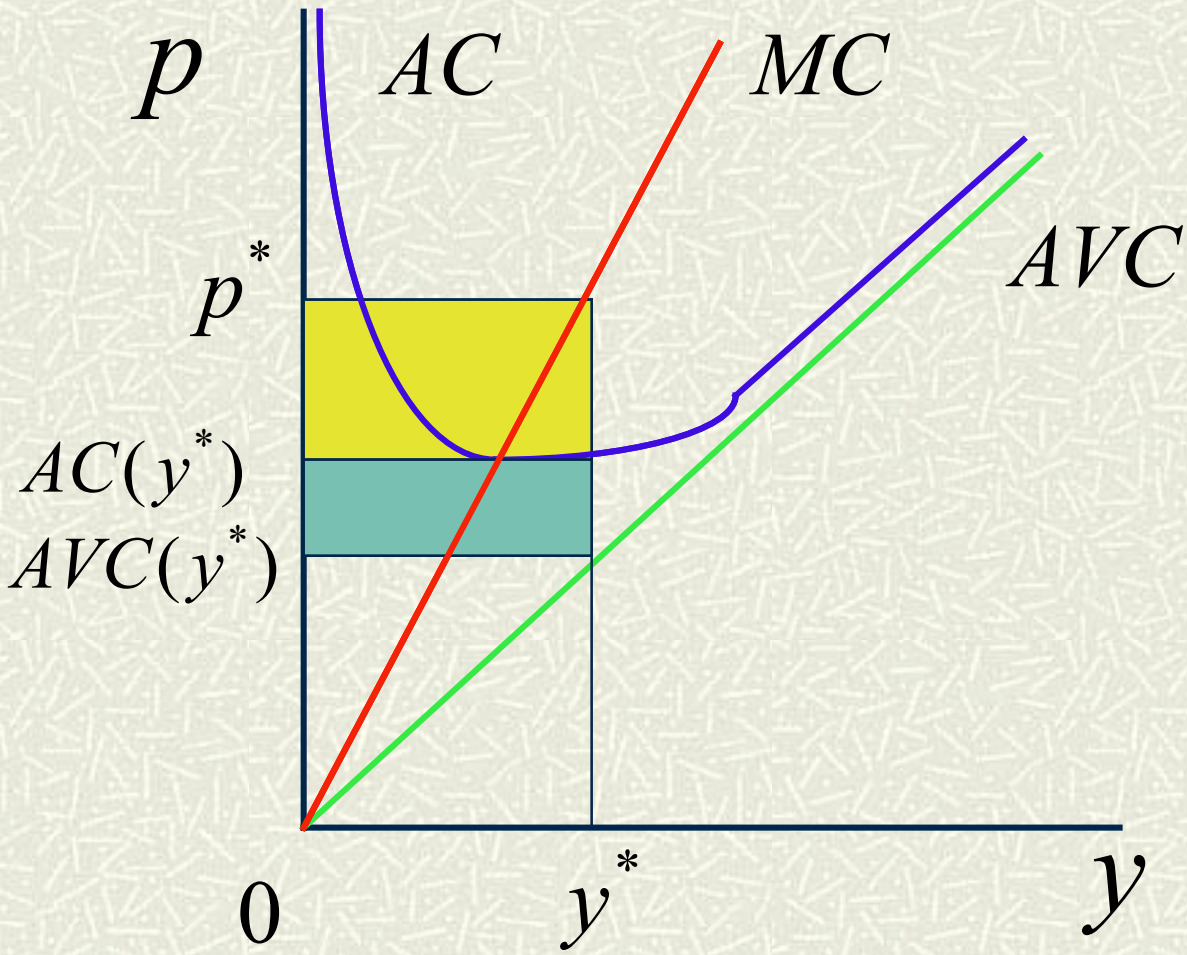
- Producer's surplus:

$$py^* - c_v(y^*)$$

- Profits:

$$py^* - c_v(y^*) - F$$

An Example: Producer's Surplus and Profits



An Example

- Output:

$$y^* = \frac{p^*}{2}$$

- Profits:

$$\Pi = py^* - \left(y^{*2} + 1\right) = \frac{\left(p^*\right)^2}{4} - 1$$

An Example

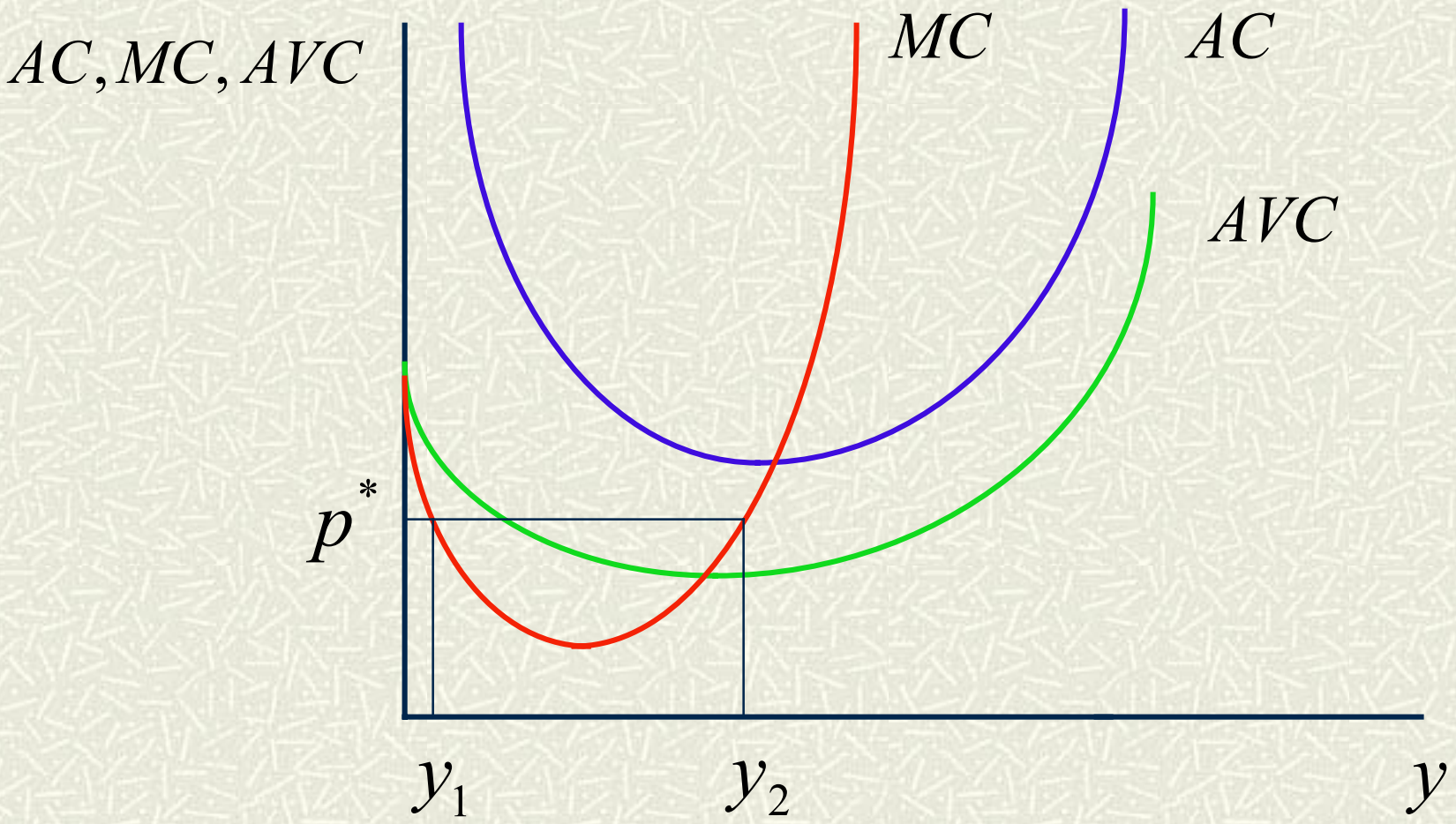
- Profits:

$$\Pi = \frac{\left(p^*\right)^2}{4} - 1$$

- Producer's surplus:

$$\frac{1}{2} p^* \left(\frac{p^*}{2} \right) = \frac{\left(p^*\right)^2}{4}$$

One Exception: y_1 or y_2 ?



A Second Exception: Shutdown!

- Profits if firm produces:

$$\Pi = py^* - c_v(y^*) - F$$

- Profits if firm does not produce:

$$\Pi = -F$$

- Producing is better if: $py^* - c_v(y^*) > 0$

A Second Exception: Shutdown!

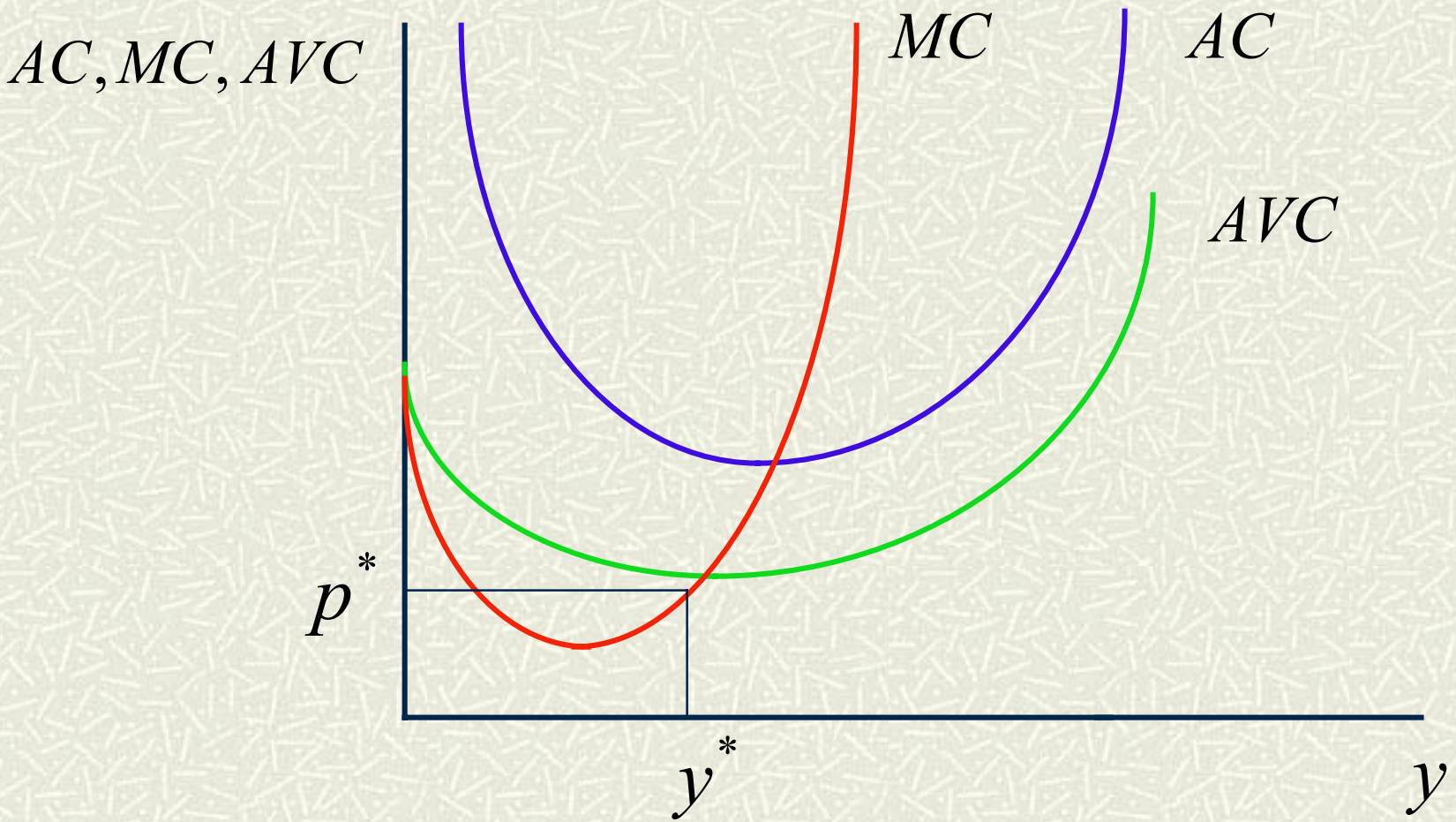
- Producing is better if:

$$py^* - c_v(y^*) > 0$$

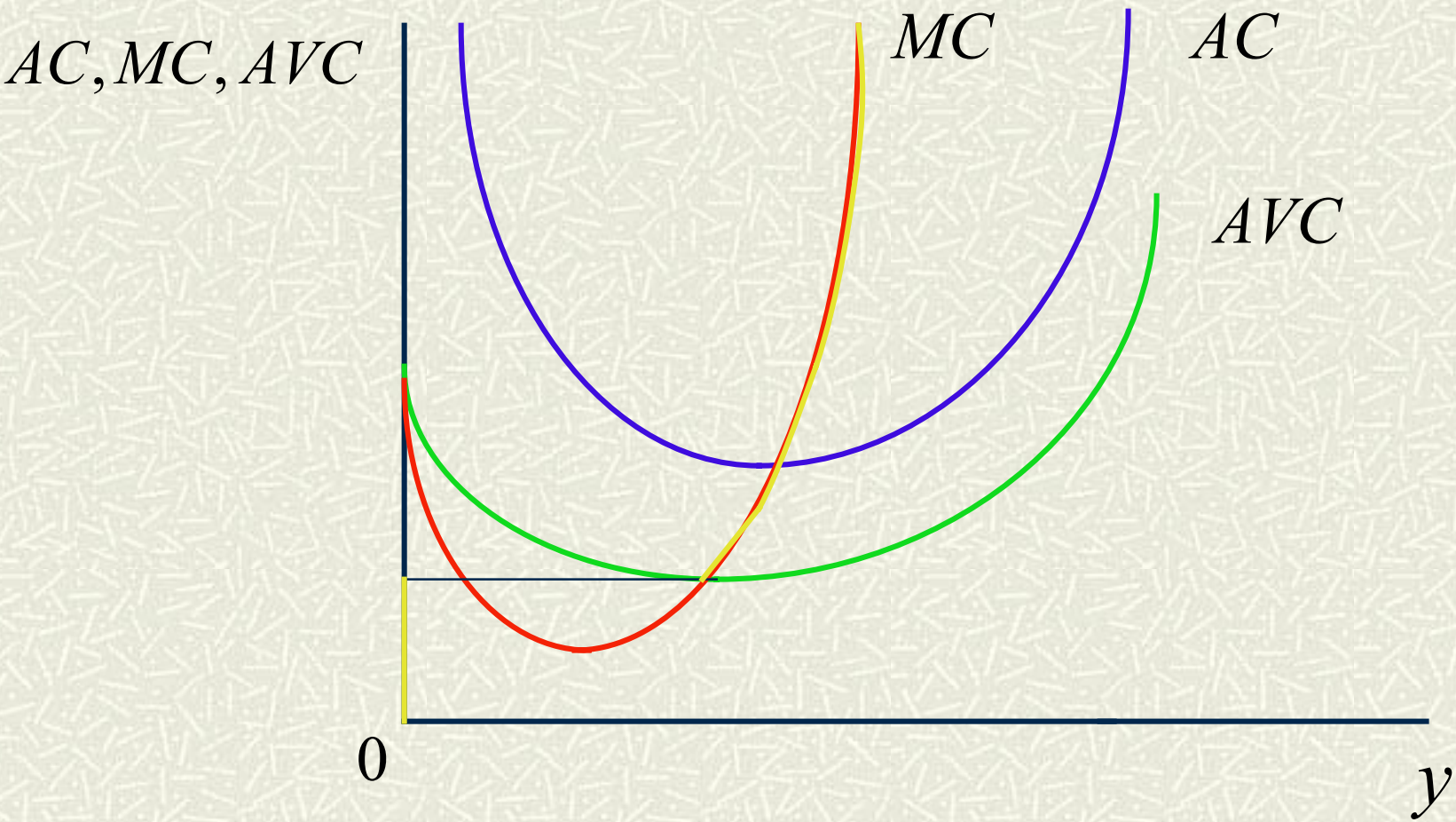
- Rearrange. Produce only if:

$$p > \frac{c_v(y^*)}{y^*}$$

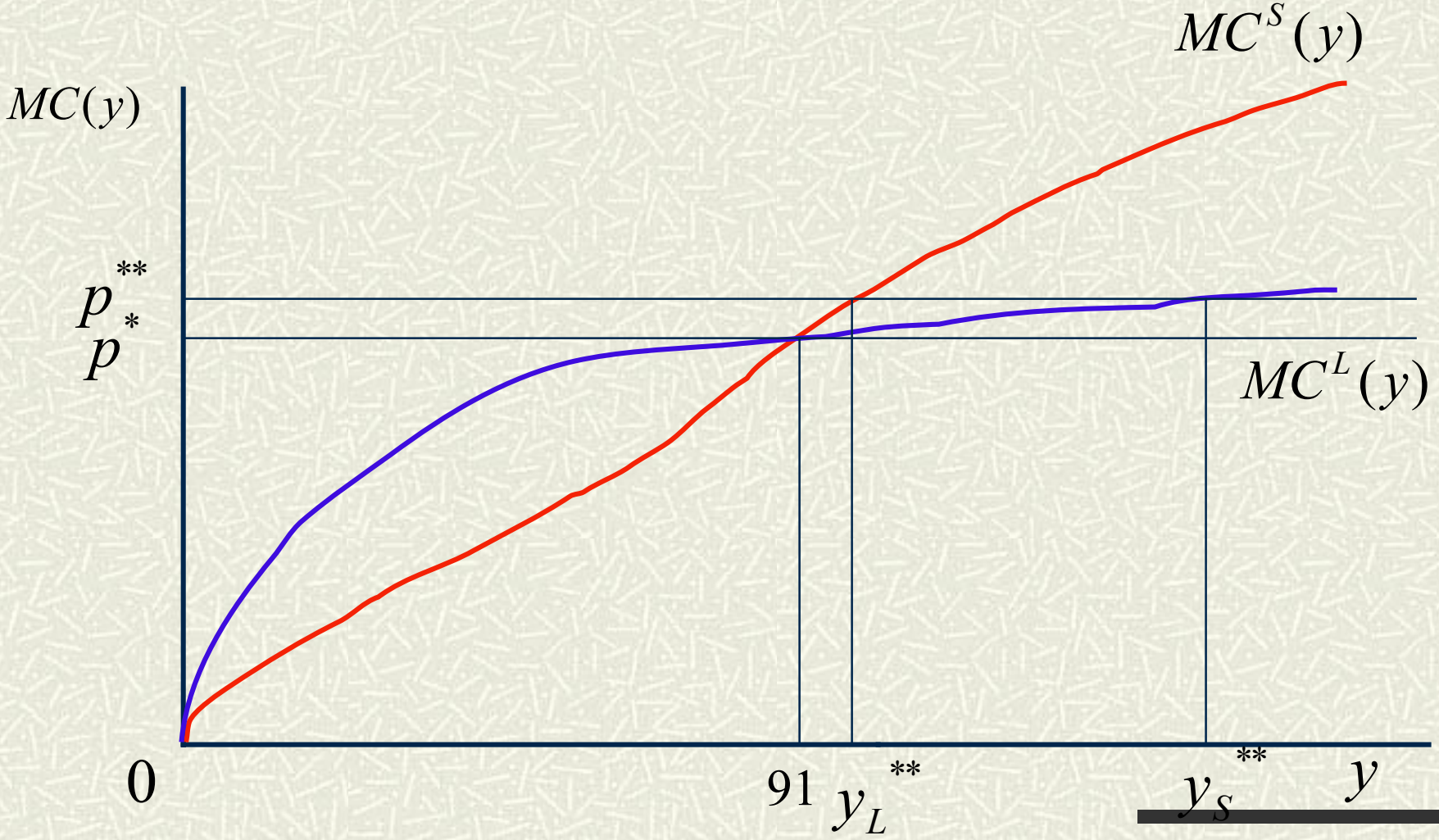
Shutdown



The Firm's Supply Curve



Long and Short Run Supply in Consultant Firm Example



Shutdown in the Short-Run and in the Long-Run

- In the short-run, the shutdown condition is:

$$p < \frac{c_v(y^*)}{y^*} = AVC(y^*)$$

- In the long-run, the shutdown condition is:

$$p < \frac{c(y^*)}{y^*} = AC(y^*)$$