MODULE 7

- Welfare
  - Ex.:

Consumer	willing to pay		Firm	Cost
1	10		1	2
2	8		2	3
3	7		3	7
4	5		4	9

EQ: P = 7   Q = 3

Consumer surplus: $(10-7) + (8-7) = 3+1 = 4$

Firm surplus: $(7-2) + (7-3) = 5+4 = 9$
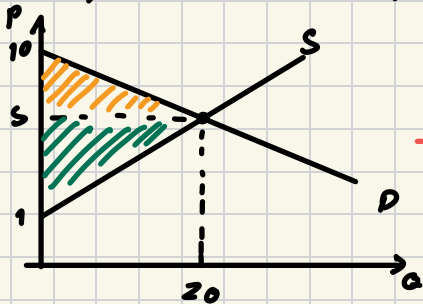
Total surplus: $4+9 = 13$

- Let's look for the general case
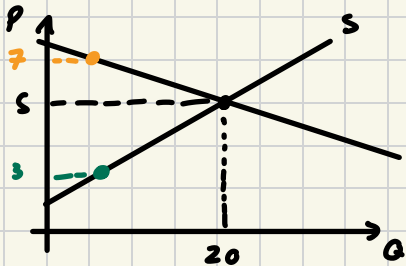
Look at 🟠 There are consumers that would buy the good for 7

Look at 🟢 there are firms which would sell the good for 3

Hence, The Economic surplus is

P
10
5
1

S

D

Q
20

/// Cons surplus
/// Prod. surplus   +
_____
     Total surplus

Math

- **Consumers:** When $Q_0 = 0$, $P_0 = 10$
  - we use the triangle area formula

  $$\frac{b \cdot h}{2} \qquad b = P_0 - P^* = 5 \implies \frac{20 \cdot 5}{2} = 50$$
  $$h = Q^* = 20$$

- **Firms:** when $Q_0 = 0$, $P_0 = 1$

  $$b = P^* - P_0 = 5 - 1 = 4 \implies \frac{20 \cdot 4}{2} = 40$$
  $$h = Q^* = 20$$

- **Total:** Prod. + Cons = $50 + 40 = 90$

Roadmap

1. Identify supply and Demand
2. Assume $Q=0 \Rightarrow$ Plug in the D $\Rightarrow$ find P_0^D
   Assume $Q=0 \Rightarrow$ Plug in the S $\Rightarrow$ find P_0^S
3. Find EQ $\Rightarrow$ P^*, Q^*
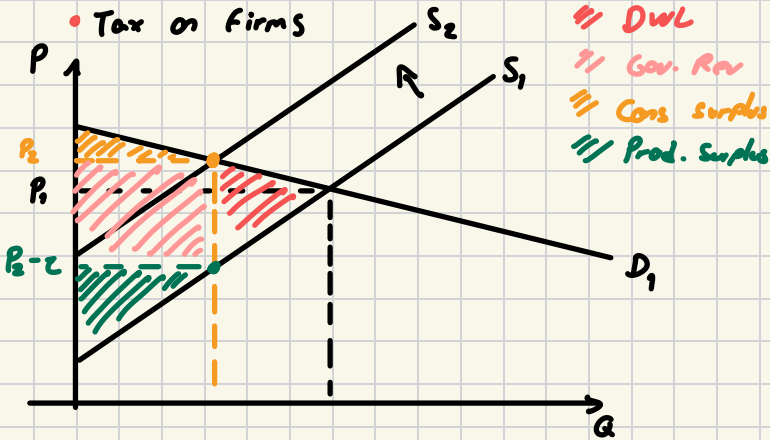4. Calculate the triangles
   Cons surplus $\quad b = Q^*, \quad h = P_0^D - P^*$
   Prod surplus $\quad b = Q^*, \quad h = P^* - P_0^S$
5. Apply the $\triangle$ Area Formula
   $$\frac{b \cdot h}{2}$$

Taxes
- Tax on Firms

Legend:
- ▨ DWL
- ▨ Gov. Rev
- ▨ Cons surplus
- ▨ Prod. Surplus

Axis labels: P, Q

Curves: S_2, S_1, D_1

Price points: P_2, P_1, $P_2 - \tau$

Question 1

P

S

P^*

D

Q^*

Q
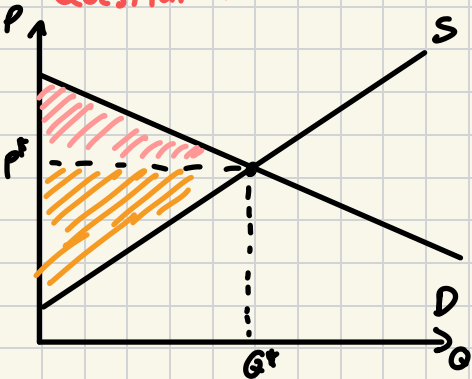
Cons. surplus

Prod. Surplus

Question 2
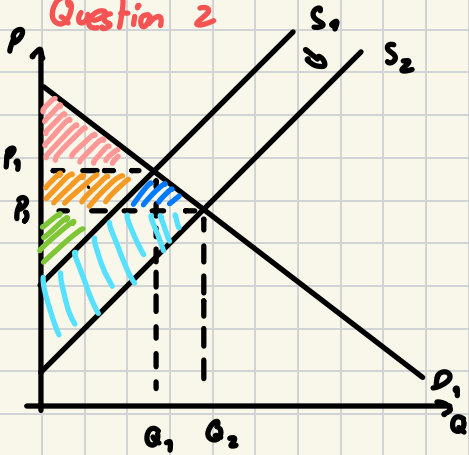
Legend:
- 🌸 → 1 (red/pink)
- ✏️ → 2 (orange)
- 🌿 → 3 (green)
- 〰️ → 4 (blue)
- 〰️ → 5 (light blue)

Graph labels: P, S_1, S_2, P_1, P_2, D_1, Q_1, Q_2, Q

	Before		**After**	
Consumers	1	<	1 + 2 + 4	
Firms	2 + 3	< #	3 + 5	
Total	1 + 2 + 3	<	1 + 2 + 4 + 3 + 5	

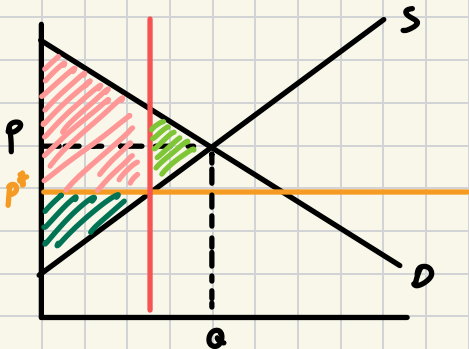| Cons.	Surplus	↑
Prod.	Surplus	?
Total	Surplus	↑

This is true because the shift is parallel

Question 3

— By Decreasing marginal utility, utility of unit i should be greater than of unit $i+1$

Unit	Marginal Benefit
1	1.00
2	0.80
3	0.6
4	0.4
5	0.2

$(1-0.5) + (0.8-0.5)$

$+ (0.6-0.5) = 0.5 + 0.3 + 0.1$

$= 0.9$

Question 4

Legend:
- DWL
- Cons. Surplus
- Prod. Surplus

P

P*

S

D

Q

Question 5

- Demand : $P = 50 - 10Q$
- Supply : $P = 10 + \frac{40}{3}Q$
- Equilibrium:

$$50 - 10Q = 10 + \frac{40}{3}Q$$

$$40 = \frac{40}{3}Q$$

$$Q^* = 3 \implies P^* = 50 - 10 \cdot 3 = 20$$

- **Consumer surplus**
  - Demand: $Q_0 = 0 \Rightarrow P_0 = 50$

  $b: P_0 - P^* = 50 - 20 = 30$
  $h: Q^* = 3$

  $$\frac{b \cdot h}{2} = \frac{30 \cdot 3}{2} = 45$$

- **Producer Surplus**
  - Supply: $Q_0 = 0 \Rightarrow P_0 = 10$
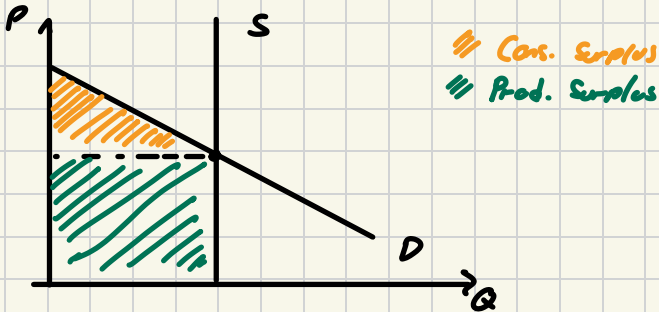
  $b: P^* - P_0 = 30 - 10 = 20$

  $h: Q^* = 3$

  $\dfrac{b \cdot h}{2} = \dfrac{20 \cdot 3}{2} = 30$

- **Total Surplus:**

  $45 + 30 = 75$
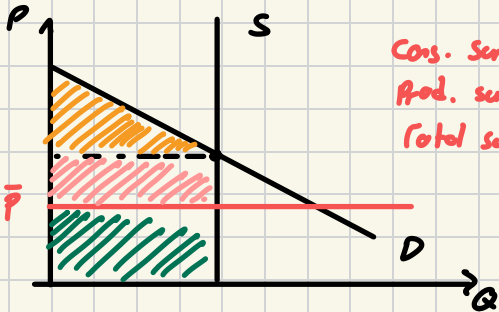
Question 6

Suppose S is perfect Inelastic

P

S

// Cons. Surplus
// Prod. Surplus

D

Q

After price ceiling

Cons. surplus 🟧 + 🟥

Prod. surplus 🟩

Total surplus: 🟧 + 🟥 + 🟩

This is also true if the D is perfect inelastic or the price ceiling is placed above the eq. price