

$$1. A. CF_{1-20} = \sum_{t=1}^{20} (10 \text{ mn}) = \$200 \text{ million}$$

$$B. DPV_{10} = \frac{CF_{10}}{(1+0.1)^{10}} = \frac{10 \text{ million}}{2.5937} = \$3,855,400$$

$$C. \text{In year } 20, \text{ value of } CF_{20} = \$10,000,000$$

$$D. TV_{20} = \frac{CF_{21}}{r-g} = \frac{10 \text{ million}}{0.1} = \$100 \text{ million}$$

$$E. TV_{21+} = \frac{DCF_{21}}{(r-g)(1+r)^t} = \frac{\$10 \text{ million}}{(0.1) \times (1.1)^{20}} = \$148,64,362$$

$$F. DPV_{0-20} = \sum_{t=1}^{20} \frac{CF}{(1+0.1)^t} = 10 \text{ million} \sum_{t=0}^{20} \frac{1}{(1.1)^t} = \$95,135,637$$

$$\therefore \text{Total value} = DPV_{0-20} + TV_{21+} = \$110,000,000$$

$$G. \frac{\text{Total value} - DPV_{0-10}}{\text{Total Value}} = \frac{1 - 0.65}{1} = 0.35 = 35\%$$

$$2. A. CF_{1-5} = \sum_{t=1}^5 (1 \text{ million}) (1+0.4)^t$$

$$= 1 \times 15.32384 = \$15,323,840$$

$$B. CF_{1-20} = \sum_{t=1}^5 CF_{t-1}(1+g) = \sum_{t=1}^5 CF_0 (1.4)^t$$

$$+ \sum_{t=6}^{10} CF_5 (1.25)^t$$

$$+ \sum_{t=11}^{20} CF_{10} (1.15)^t$$

$$= \$453,731,743$$

$$C. DPV_{1-10} = \sum_{t=1}^5 \frac{CF_t (1.4)^t}{(1+0.2)^t} + \sum_{t=1}^5 \frac{CF_5 (1.25)^t}{(1+0.2)^t}$$

$$= \$20,365,033 \times 0.9 = \$18,328,427$$

$$D. DPV_{11-20} = \sum_{t=1}^{10} \frac{CF_{10} (1.15)^t}{(1+0.2)^t} = \$21,132,897$$

$$E. TV_{21+} (\text{year } 0) = \frac{DPV_{21}}{(0.2 - 0.05)} = \$11,546,566$$

$$F. \text{Total value} = \sum_{t=0}^{20} DPV_t + TV_{21+} = \$54,044,486$$

~~Total~~

2. G

$$\text{Value in years 0-5} = \frac{\text{DPV}_{0-5}}{\text{total}} = \frac{9129758}{54044486} = 17\%$$

H

$$\text{Value in years 0-10} = \frac{\text{DPV}_{0-10}}{\text{total}} = \frac{21,365,032}{54,044,486} = 40\%$$

I

$$\begin{aligned}\text{Value in years 11+} &= 1 - (\text{Value in years 0-10}) \\ &= 60\%\end{aligned}$$

3. A. In perfect competition,

$$\text{demand} = \text{supply}$$

$$\Rightarrow 2300 - 4Q = 200 + 3Q$$

$$\text{STC} \Rightarrow 2100 = 7Q$$

$$\Rightarrow Q = 300$$

$$\text{Eq. price } S = 200 + 3 \times 300 = \$1100$$

B. Eq qty. = 300

C. Profit = $Q \times \text{Price} - Q \times \text{avg total cost} = 9(1100 - 700) = \3600

D. Firm C will supply $\Rightarrow 200 + 100Q = 1100$

$$\Rightarrow Q = \frac{900}{100}$$

$$\Rightarrow Q = 9$$

E. Avg. total cost = $\frac{\sum_{Q=1}^9 200 + 100Q}{9} = \frac{6300}{9} = \700

$$4. MC = 175 + \frac{Q}{2}$$

$$\text{Demand} = 2300 - 4Q$$

$$\text{Revenue} = 2300Q - 4Q^2$$

$$\therefore MR = 2300 - 8Q$$

$$\text{In monopoly, } MC = MR$$

$$\Rightarrow 175 + \frac{Q}{2} = 2300 - 8Q$$

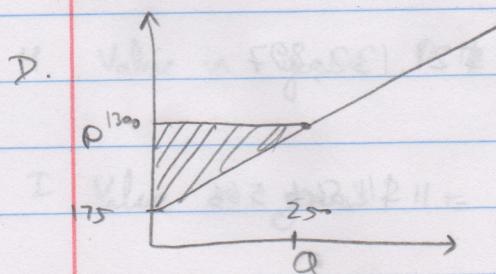
$$\Rightarrow 8.5Q = 2125$$

$$\therefore \text{Producer surplus} = Q = 250$$

$$Q = 250$$

$$B. P = 2300 - 4 \times Q = \$1300$$

$$C. \text{Revenues} = P \cdot Q = 1300 \times 250 = \$325,000$$



Producer surplus

$$= \frac{1}{2} \times 250 \times (1300 - 175)$$

$$= \$140,625$$