

① Question 1

$$Z^f(K, n^d) = 2\sqrt{KN^d}$$

labour
at
Pigou

$$f(Z) = 16\sqrt{\frac{1}{16} \times N^d}$$

$$w=1$$

$$\pi = TR - TC$$

$$TR = p\left(16\sqrt{\frac{1}{16}N^d}\right) - N^d \times 1$$

$$\pi = p\left(16\sqrt{\frac{1}{16}N^d} - N^d\right)$$

$$\frac{\partial \pi}{\partial N^d} = p\left(\frac{1}{16}\right)^{\frac{1}{2}} (N^d)^{\frac{1}{2}} - N^d$$

$$= p\left(N^d\left(\frac{1}{2}\right)\right) - N^d$$

$$= \frac{1}{2}N^d - 1 = 0$$

$$N^d = \frac{1}{4}$$

$$= \frac{1}{2}N^{\frac{1}{2}} - 1 = 0$$

$$N^d^{-\frac{1}{2}} = 2$$

$$2 \times \frac{1}{2}N^{\frac{1}{2}} = 1 \Rightarrow$$

$$\frac{1}{N^d} = 2 \Rightarrow N^d = \frac{1}{2}$$

$$\textcircled{2} \quad V = C + 4\sqrt{L} + 2$$

$$C = \underline{n}(1-t)(h-L) + \pi$$

$$= 1(1-2)(16-L) + 2$$

$$C = 16L - L^2 - 32 + 2L$$

$$\quad \quad \quad \left(L(16-L) - 2(16-L) \right)$$

C^*

$$-L^2 + 18L - 32 + 2$$

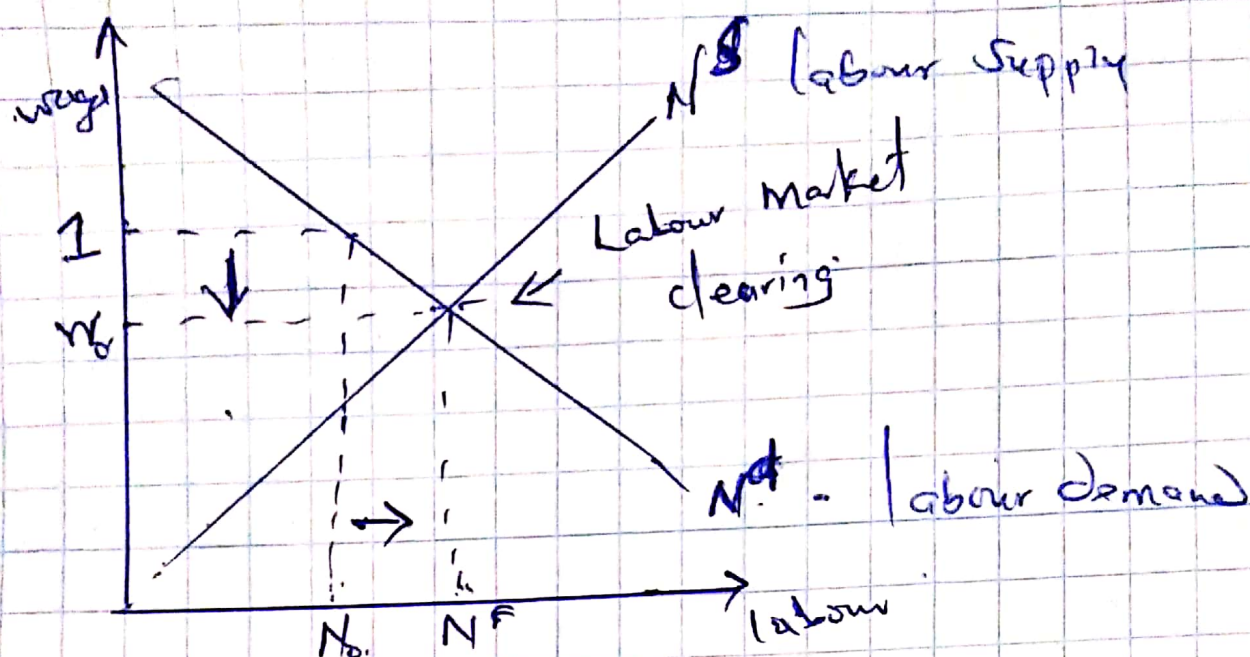
e

$$C = \boxed{-L^2 + 18L - 30}$$

$$V_{\max} = \underline{f(x)} + \lambda (\text{cost function / budget function})$$

$$V_{\max} = C + 4\sqrt{L} + 2 + \lambda (-L^2 + 18L - 30)$$

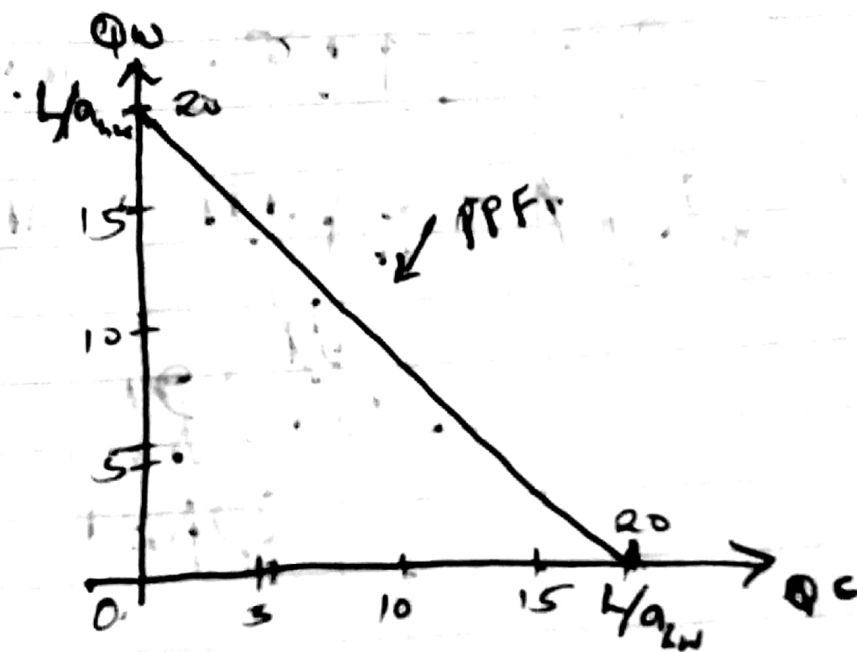
④



The labour demand and labour supply would not clear in labour market. This is because the labour demand is ^{less} smaller than the labour supply.

The required labour demand is 1 ^{while} and the labour supply is 20. The wage is too high and therefore for the labour market to clear the wage will be pushed downward.

3 Production Possibility Frontier



$$a_{LC}Q_C + a_{LW}Q_W = L$$

$$a_{LW} = 1 = w(\text{wage})$$

$$Q_C + Q_W = 20$$

No. 2 Continuation

$$V_{\max} = 254 - 16L + \lambda(-L^2 + 18L - 30) \rightarrow$$

$$\frac{dy}{dL} = -16 + -2\lambda L + 18\lambda = 0$$

$$= \frac{-2\lambda L}{\cancel{-2}} + \frac{18\lambda}{\cancel{-2}} = 16$$

$$\lambda L + 9\lambda = -8$$

$$\lambda(L+9) = -8$$

$$\boxed{L+9 = \frac{-8}{\lambda}} \quad \text{or}$$

$$L = \frac{-8}{L+9} \quad \text{--- (1)}$$

$$\frac{dy}{d\lambda} = -L^2 + 18L - 30 = 0$$

$$\Rightarrow L^* = \approx 20$$

$$\lambda = \frac{-8}{20+9}$$

$$C^* = 254 - 16(L)$$

$$= 254 - 320$$

$$= -66$$

$$\boxed{C^* = -66}$$

Therefore

$$L^* = 20 \text{ units}$$

$$C^* = 66$$

Q. 5.

$$\text{Real Wage} = \frac{w}{p}$$

$$= \frac{\text{Wage (units of labour at equilibrium)}}{\text{Price of labour}}$$

$$= \frac{20}{1}$$

$$= 20$$

When labour market is clearing $N^d = N^s$

$$\text{Labour supply} = 20$$

$$\text{Labour demand} = 1$$

$\therefore$ The equilibrium units of labour required = 10

$$\therefore (10 = 10) \text{ implying } N^d = N^s$$

$$Y = (\text{Income}) = (N \times P_L)$$

$$= (20 \times 20)$$

$$= \underline{\underline{400 \text{ units}}}$$

$$\pi = TR - TC$$

$$TR = P \cdot Q - W \cdot L$$

$$= 2 \text{ units}$$

$$C = C = W(L - t(X_h - 1)) + \pi = \underline{\underline{66 \text{ units}}}$$