1. a) If commodity 1 is x & commodity 2 is y
then BC $\Rightarrow$ $40 = 10x + 5y$

b) $40/10 \Rightarrow x = 4$

c) $40/5 \Rightarrow y = 8$

e) $40 = 5x + 5y$

g) $30 = 5x + 5y$

2. Two commodities, G & V

a) $V = 0$

b) $2G = 6V$

so $2 \cdot 15 = 30 = 6V$

$\Rightarrow V = 5$

c) $2G = 6V$

$\boxed{0 = 6V - 2G}$ or $V = \frac{1}{3}G$

3. a) Speeches by Politicians = P

Speeches by Administrators = A

$\therefore$ BC $\Rightarrow$ $50 + P + 2A = 15X$

or $50 = 15X - P - 2A$

4 a) see graph

b) Yes, for example, he can buy 15 apples and 10 bananas.

c) $\frac{\partial U/\partial A}{\partial U/\partial B} = \frac{B}{A} = \frac{P_A}{P_B} = \frac{1}{2} \rightarrow \frac{B}{A} = \frac{1}{2}$

so $2B = A$

Plug into ~~income~~ budget constraint:

$40 = A + 2B$

$40 = 2B + 2B = 4B$

$\Rightarrow B = 10 \quad A = 20$

So the optimal point on the budget constraint is $B = 10 \quad A = 20 \Rightarrow U = 200$

Charlie cannot reach a higher utility given his budget constraint so $U = 300$ is not feasible.

d) see graph

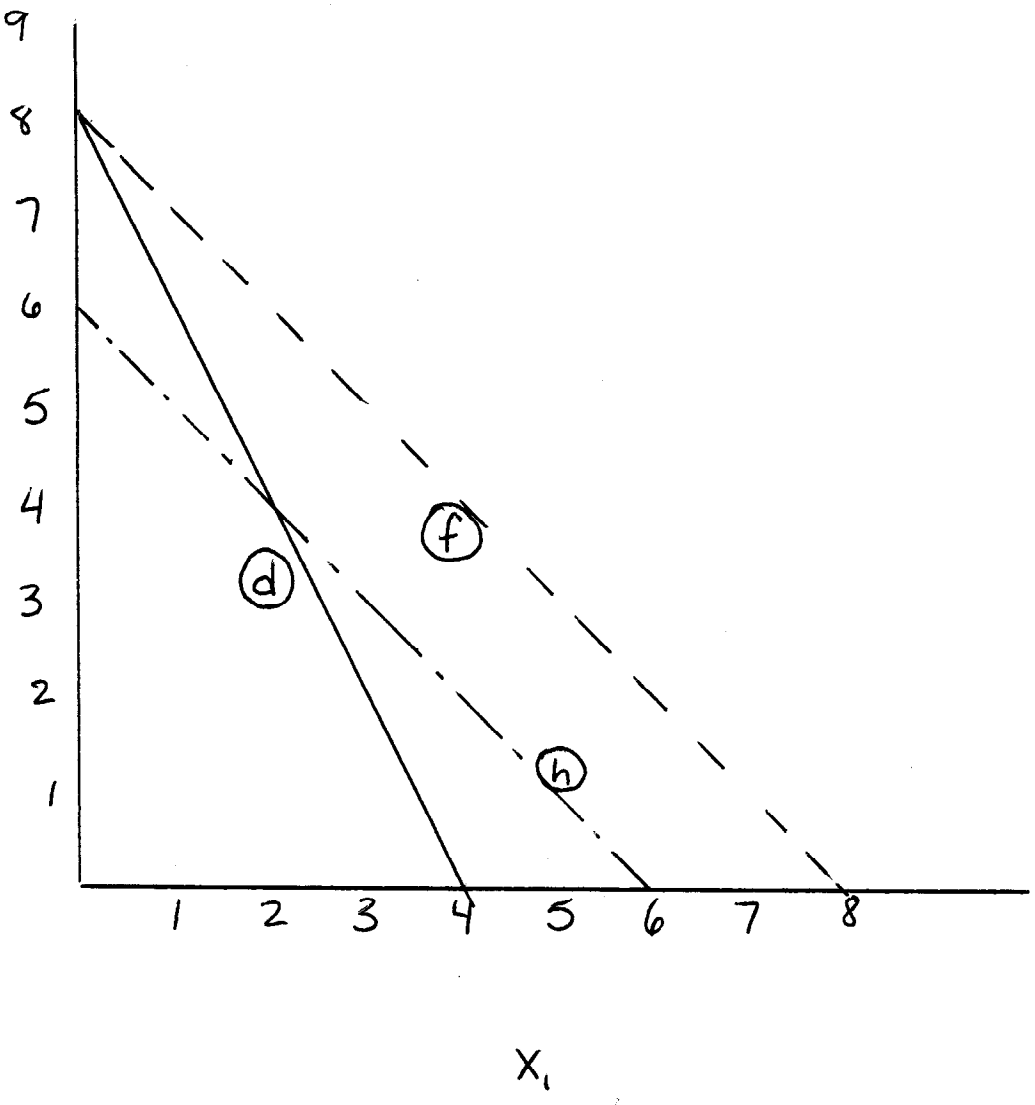
e) $-\frac{1}{2}$

f) $B/A = \frac{1}{2}$

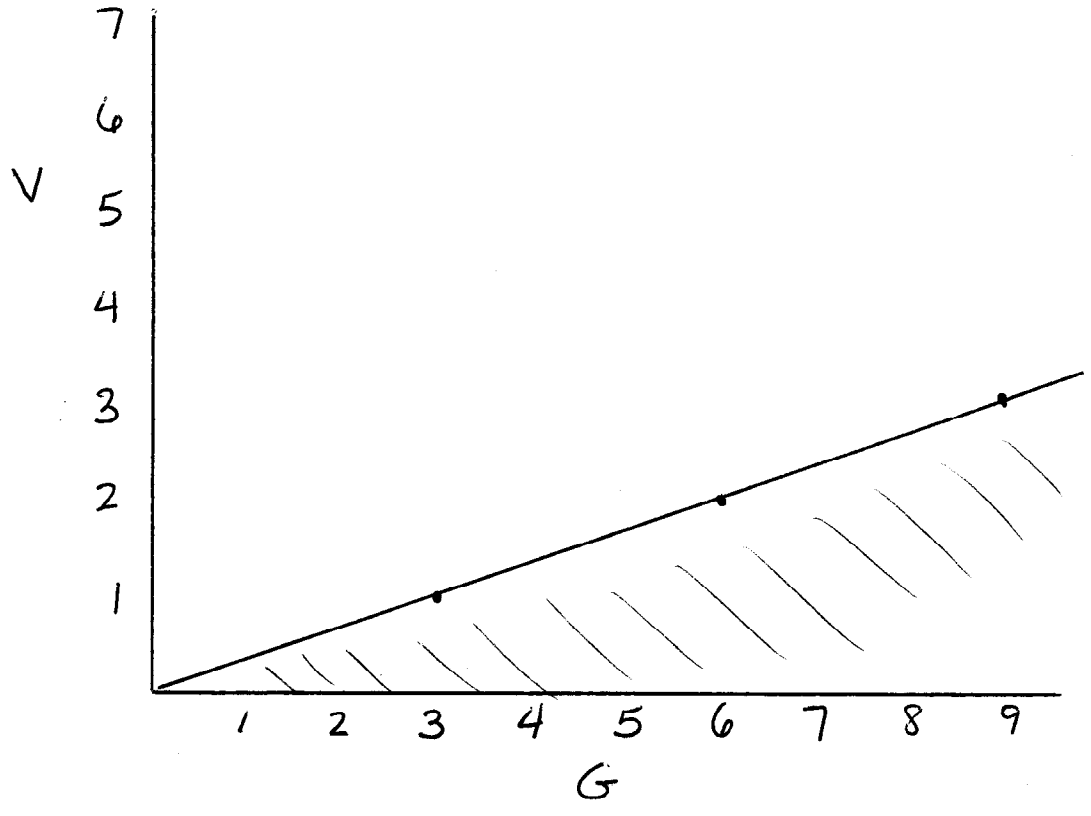
g) $10 \cdot 20 = U = 200$

h) At $(20, 10)$ $B/A = \frac{1}{2}$ so U curve must be just tangent.

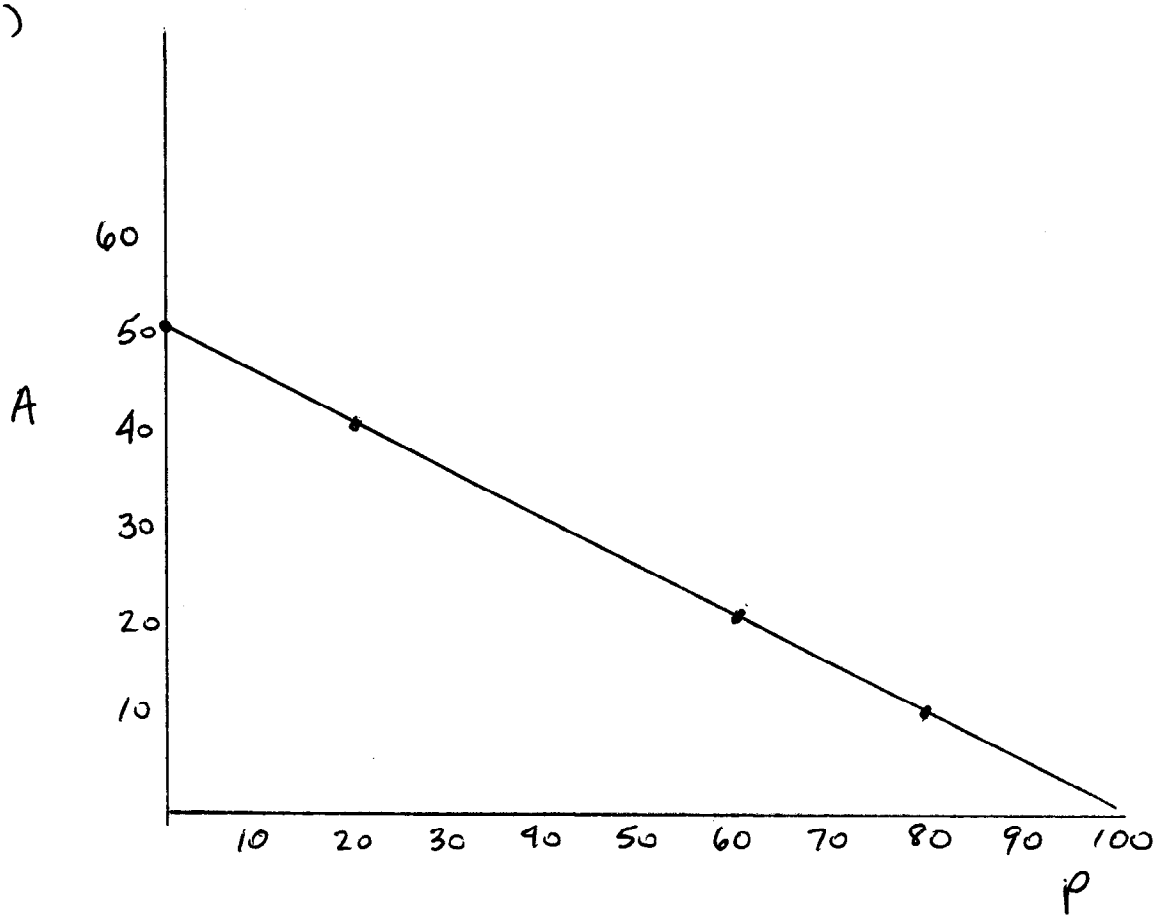
1)



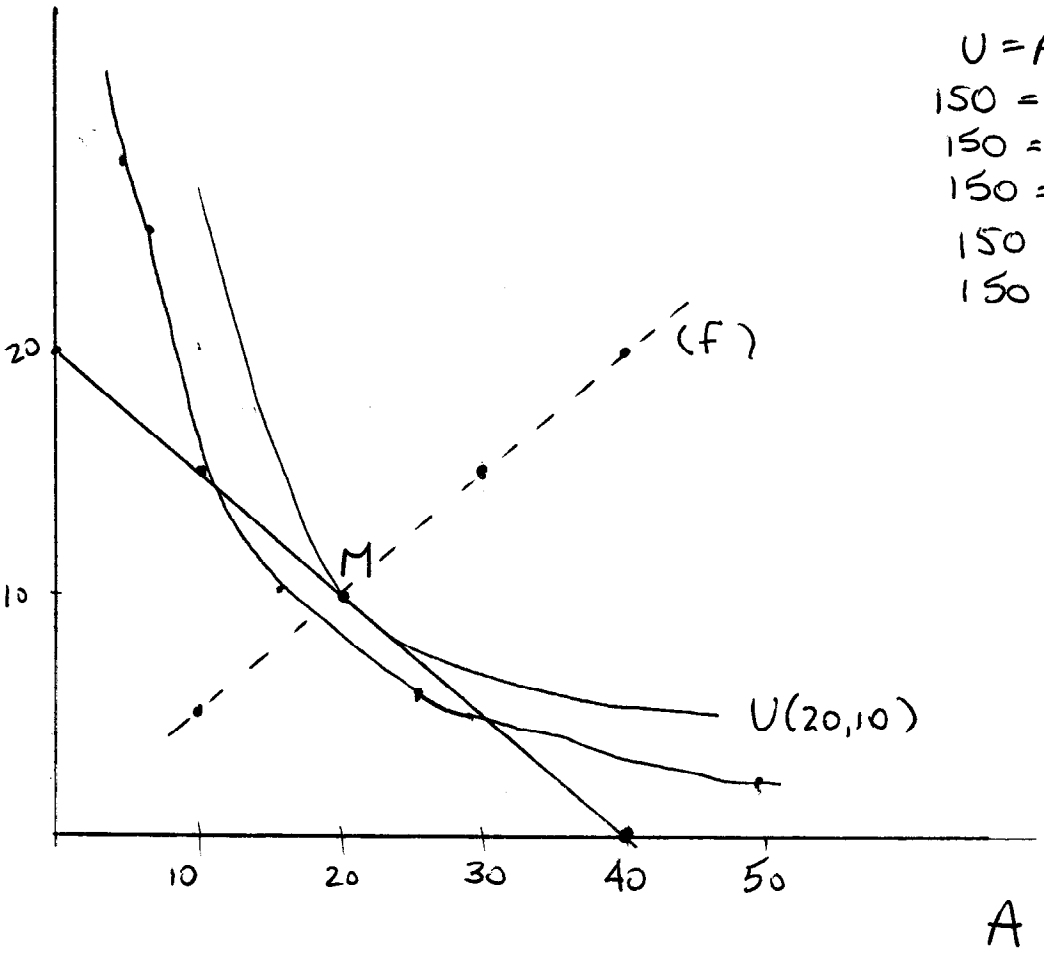
2) d)



3. b)



4 a)



$U = AB$

$150 = (1)(150)$

$150 = (2)(75)$

$150 = (3)(50)$

$150 = (5)(30)$

$150 = (6)(25)$

$(10)(15)$

$(15)(10)$

$(25)(6$

5 a) $U = 4\sqrt{n} + b$ (also graph)

$20 = 4\sqrt{9} + b$ $\quad$ $20 = 4\sqrt{4} + b$

$20 = 4 \cdot 3 + b$ $\quad$ $= 8 + b$

$b = 8$ $\quad$ $b = 12$

$20 = 4\sqrt{1} + b$ $\quad$ $20 = 4 \cdot 0 + b$

$b = 16$ $\quad$ $b = 20$

b) see graph

$$\frac{\partial U/\partial n}{\partial U/\partial b} = \frac{2n^{-\frac{1}{2}}}{1} = \frac{p_n}{p_b} = \frac{1}{2}$$

$$\frac{2}{\sqrt{n}} = \frac{1}{2} \rightarrow \sqrt{n} = 4 \rightarrow n = 16$$

c) $24 = n + 2b$

$24 = 16 + 2b$

$8 = 2b \Rightarrow b = 4$

~~the boys & berries~~

d) $25 = 4n^{\frac{1}{2}} + b$

If $n = 9 \quad b = 13$
$n = 4 \quad b = 17$
$n = 1 \quad b = 21$

e) $\max \mathcal{L} = 4n^{\frac{1}{2}} + b - \lambda(34 - n - 2b)$

$\frac{\partial \mathcal{L}}{\partial n}$ etc will be the same as part b) except that

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 34 - n - 2b.$$

Looking at b) we see that λ still $= \frac{1}{2}$
n still $= 16$
but $b = 9$

g) BC $= 9 = n + 2b$
$\Rightarrow b = 4.5 - \frac{1}{2} n$ slope $= -\frac{1}{2}$

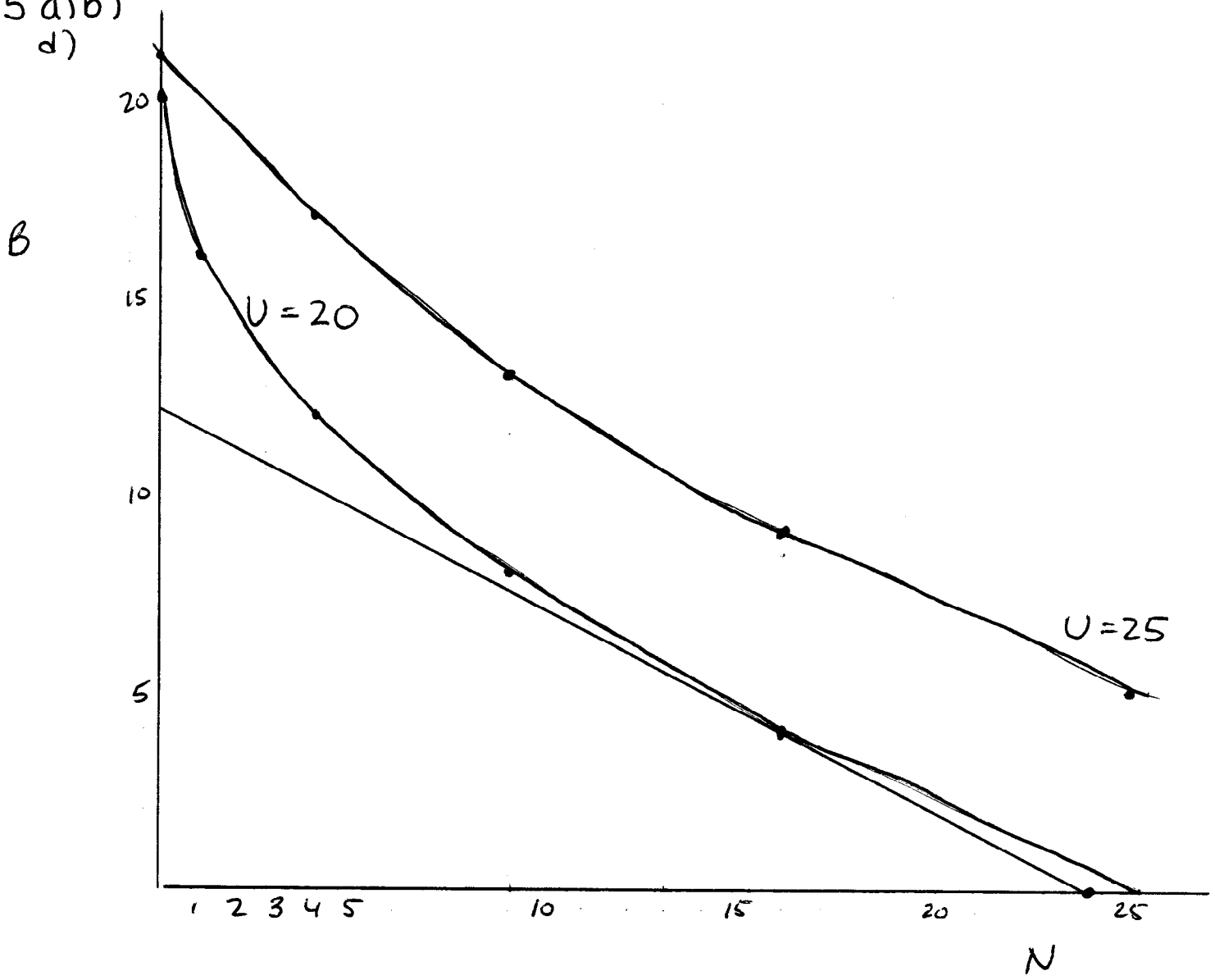
h) MRS $= \frac{mu_n}{mu_b} = \frac{2n^{-\frac{1}{2}}}{1} = \frac{2}{n^{1/2}}$

if $n = 9$ MRS $= 2/3$

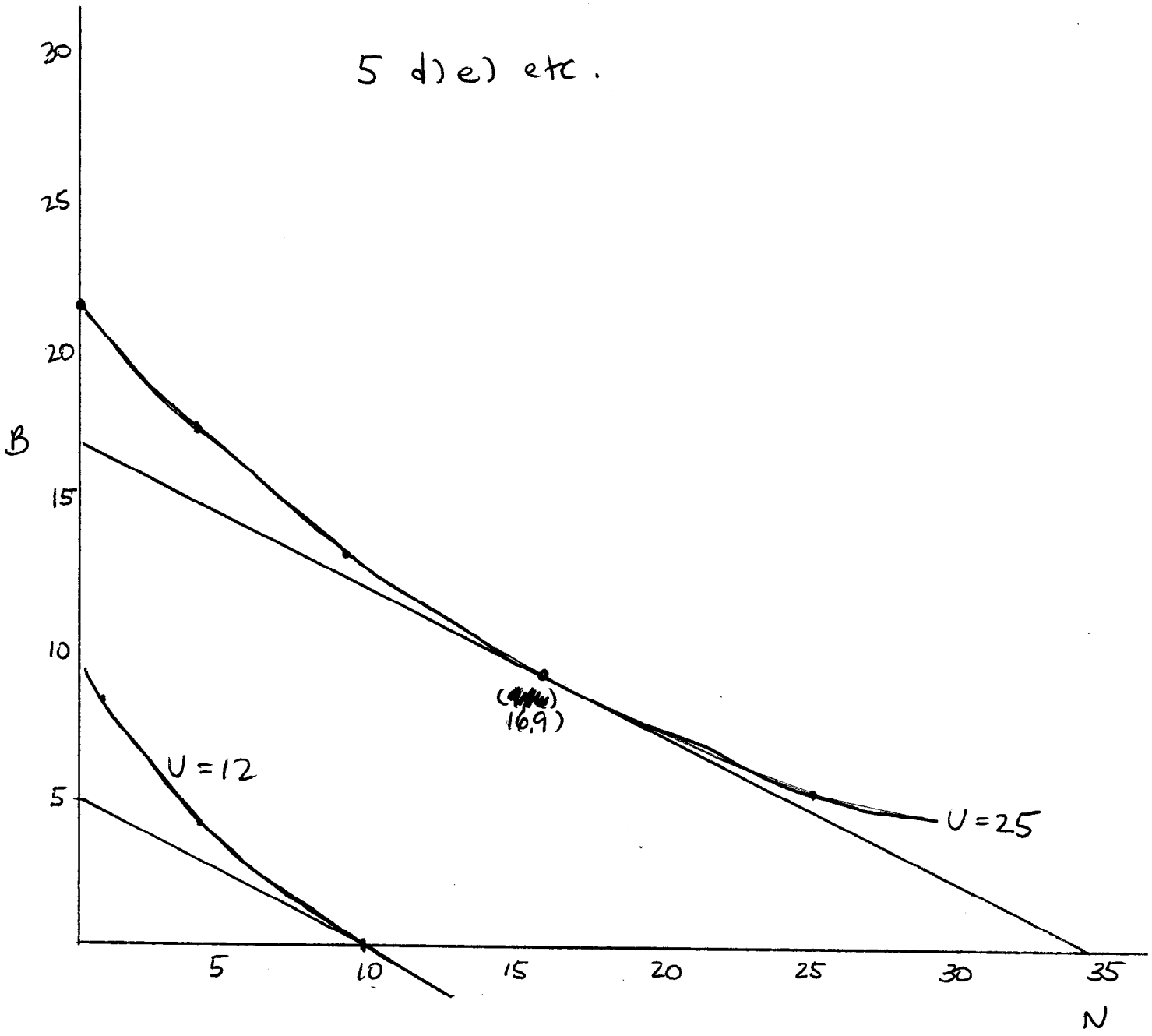
So the indiff curve is steeper

i) NO

5 a) b)
d)



5 d) e) etc.



6. a) $\partial U/\partial x = \frac{1}{2}x^{-\frac{1}{2}}y^{\frac{1}{2}} = \frac{1}{2}\left(\frac{y}{x}\right)^{\frac{1}{2}}$

b) $\partial U/\partial y = \frac{1}{2}x^{\frac{1}{2}}y^{-\frac{1}{2}} = \frac{1}{2}\left(\frac{x}{y}\right)^{\frac{1}{2}}$

c) $MRS = \frac{\frac{\partial U}{\partial x}}{\frac{\partial U}{\partial y}} = \frac{\frac{1}{2}\left(\frac{y}{x}\right)^{\frac{1}{2}}}{\frac{1}{2}\left(\frac{x}{y}\right)^{\frac{1}{2}}} = (y^{\frac{1}{2}}x^{-\frac{1}{2}})(x^{-\frac{1}{2}}y^{\frac{1}{2}}) = \frac{y}{x}$

since $MRS = \frac{P_x}{P_y} \Rightarrow \frac{y}{x} = \frac{8}{4} \rightarrow 4y = 8x$

$y = 2x$

Plug into BC:

$I = 8x + 4y$

$I = 8x + 8x = 16x \qquad x = I/16 \quad y = I/8$

d) $\frac{MU_x}{MU_y} = \frac{P_x}{P_y} \Rightarrow \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$

additional utility from a dollar spent on X must = additional utility from a dollar spent on y.

Hmwk 2 #7

$$\frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{y+1}{x+2} = 1 \rightarrow x+2 = y+1$$
$$x = y-1$$

$$11 = x+y \rightarrow 11 = y-1+y$$
$$12 = 2y$$
$$y = 6 \quad x = 5$$

$$\frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{y+1}{x+2} = \frac{1}{2} \rightarrow 2y+2 = x+2$$
$$2y = x$$

$$11 = x+y \rightarrow 11 = 3y$$
$$y = \frac{11}{3} \quad x = \frac{22}{3}$$