MAT 1700

LØSNINGSFORSLAG

SEMINAR # 4

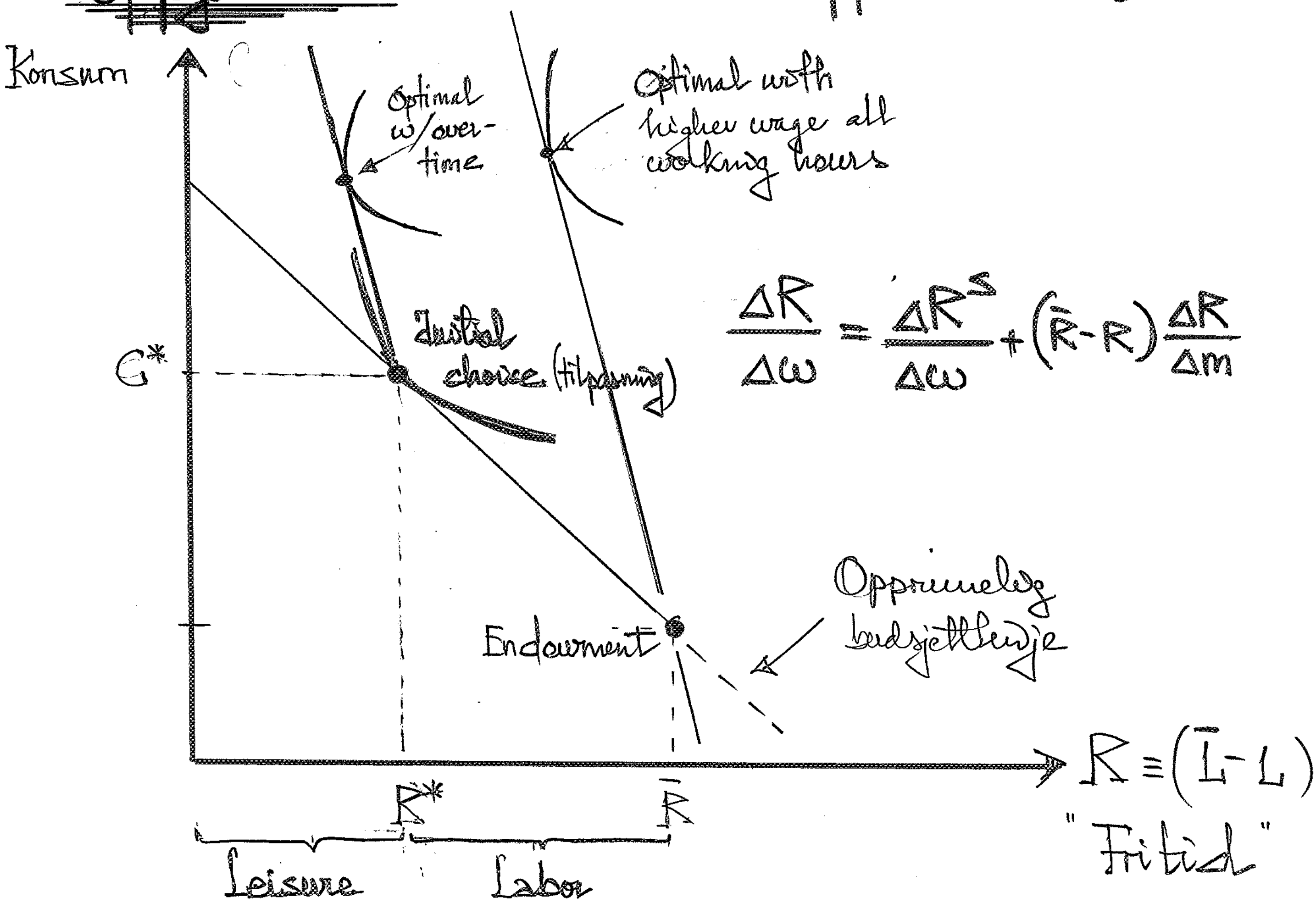
Merk: Oppgavene 7-9 dekker pensum gjennomgått i forelesning

Løsningsforslag oppgavesett #4

Optimal konsumtilpasning med 'endowment'

Oppgave 1

(Varian pp. 175–176)



$$\frac{\Delta R}{\Delta \omega} = \frac{\Delta R^S}{\Delta \omega} + (\bar{R} - R)\frac{\Delta R}{\Delta m}$$

* Over-time (for extra hours worked) ⇒ pure substitution effect
* Increase in wage-rate ⇒ substitution + income effect

Overtime ⇒ <u>increases</u> labor-supply!

<u>Decreases</u> labor-supply!

Oppgave 2 "Normalt gode"

$(\omega_1 - x_1) < 0 \Rightarrow x_1 > \omega_1 \Rightarrow$ "etterspørrer"

$\Delta p_1 > 0 \ldots$ Slutsky-effekt tot. etterspørsel?

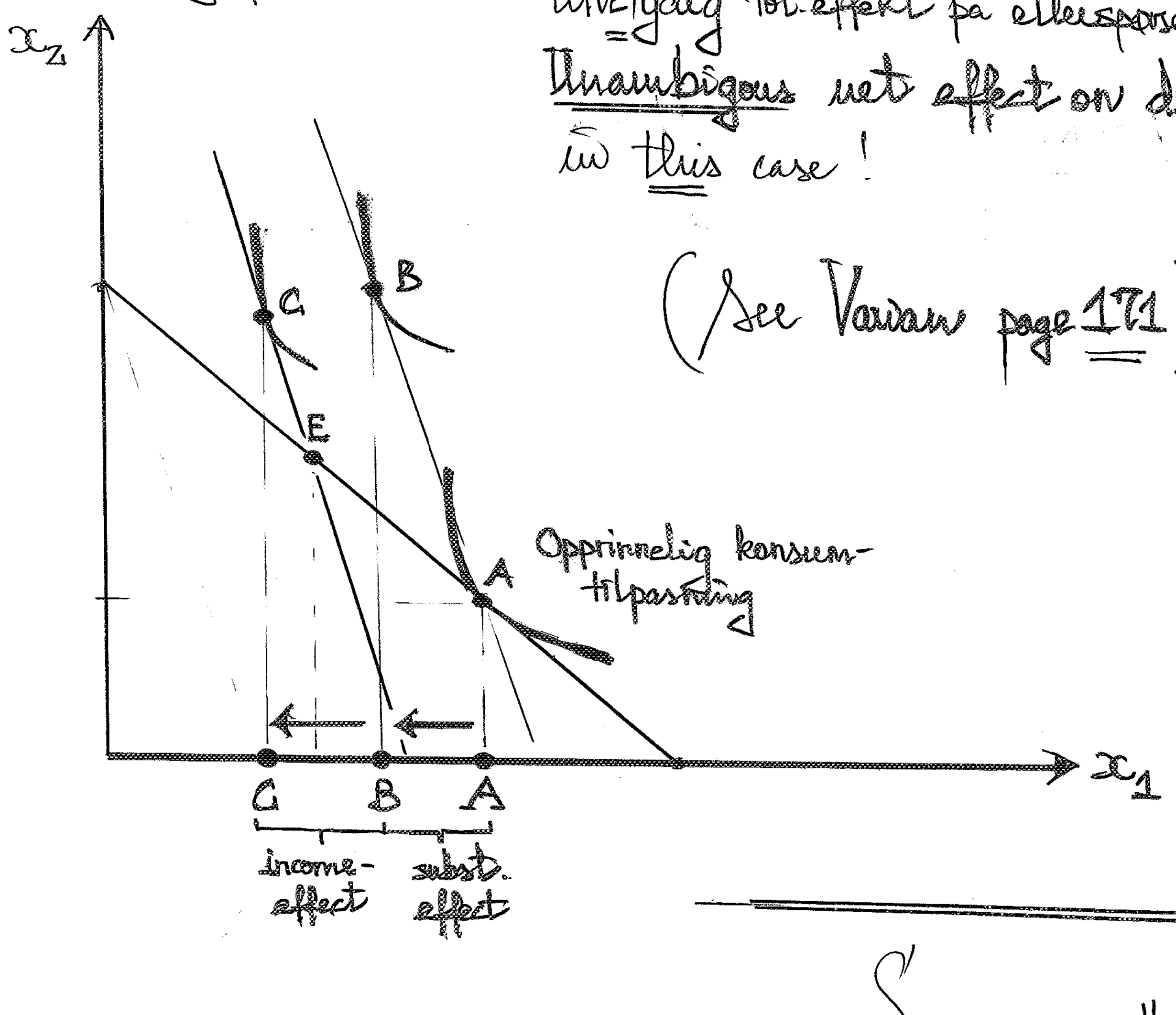
$$\frac{\Delta x_1}{\Delta p_1} = \frac{\Delta x_1^s}{\Delta p_1} + (\omega_1 - x_1)\frac{\Delta x_1^m}{\Delta m}$$

$$(-) = (-) + (-) \times (+)$$

Inverse effect $\Rightarrow$ since $\Delta p_1 > 0 \Rightarrow \Delta x_1 < 0$ (in total)

Let's graph it ...... "Utvetydig tot. effekt på etterspørsel etter x_1"

Unambigous net effect on demand in this case!



(See Varian page 171)

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Oppgave 3 "Normalt gode"

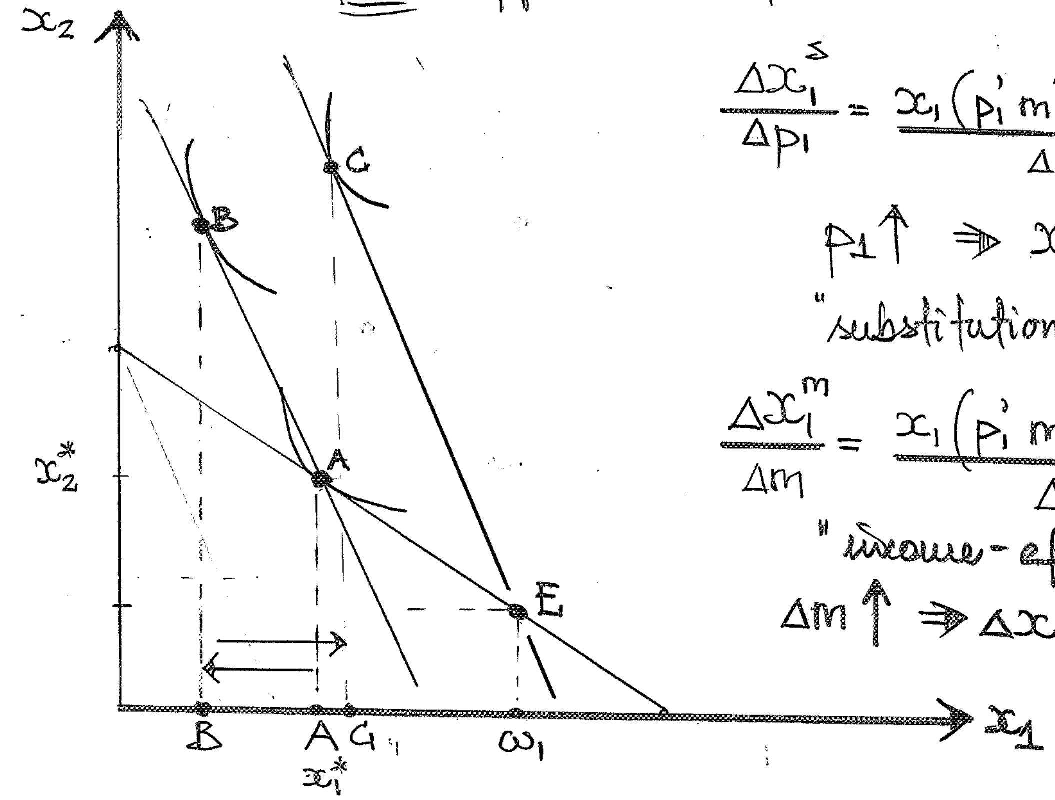
$(\omega_1 - x_1) > 0 \Rightarrow$ tilbyder (endowment exceeds demand)

$p_1 \uparrow$ ... then what happends to total demand for x_1?

$$\frac{\Delta x_1}{\Delta p_1} = \frac{\Delta x_1^s}{\Delta p_1} + (\omega_1 - x_1)\frac{\Delta x_1^m}{\Delta m}$$

$$? = (-) \quad (+)\ (+)$$

Ambiguity .... size of respective effect determines final ~~affect~~ on demand.



$$\frac{\Delta x_1^s}{\Delta p_1} = \frac{x_1(p_1' m') - x_1(p_1 m)}{\Delta p_1} < 0$$

$p_1 \uparrow \Rightarrow x_1^s \downarrow$

"substitution-effect"

$$\frac{\Delta x_1^m}{\Delta m} = \frac{x_1(p_1' m) - x_1(p_1', m')}{\Delta m}$$

"income-effect"

$\Delta m \uparrow \Rightarrow \Delta x_1^m \uparrow$

$$\boxed{\frac{\Delta x_1}{\Delta p_1} = \frac{x_1^s}{\Delta p_1} - \frac{x_1^m}{\Delta m} = \left[\frac{x_1(p_1' m') - x_1(p_1 m)}{\Delta p_1}\right] - \left[\frac{x_1(p_1' m) - x_1(p_1' m')}{\Delta m}\right]}$$

Ikke beregn dette uttrykket under gjennomgåelsen!

Oppgave 4 Slutsky-uttrykket supplert endowment

Hvorfor: Allowing endowments of 'things' (capital that can be transferred to consumption) and, at the same time, allowing a price-change into the model, must necessarily involve a change in money income (m)

"Money income was held constant"

Previously: income effect due to a change in purchasing power when a price changes = "ordinary income effect." F. ex: "When a price falls, you can buy as much of a good as before, and have some money left over."

Endowment income effect.... must now be taken into account: When a price changes, the price-change changes the value of the endowment and thus changes the purchasing power of the money income. Hence; an extra income effect from the influence of the prices on the value of the endowment bundle.

Total change in demand

= Δ due to substit. effect + Δ due to ord. income effect + Δ due to endowm. income effect

$$\frac{\Delta x_1}{\Delta p_1} = \frac{\Delta x_1^s}{\Delta p_1} + (\omega_1 - x_1)\frac{\Delta x_1^m}{\Delta m}$$

$$? = (-) + (+/-) * (+)$$

Sign depend on whether 'demander' or 'supplier'

$\frac{\Delta x_1^m}{\Delta m} > 0$ for 'normal good'

Labor-market

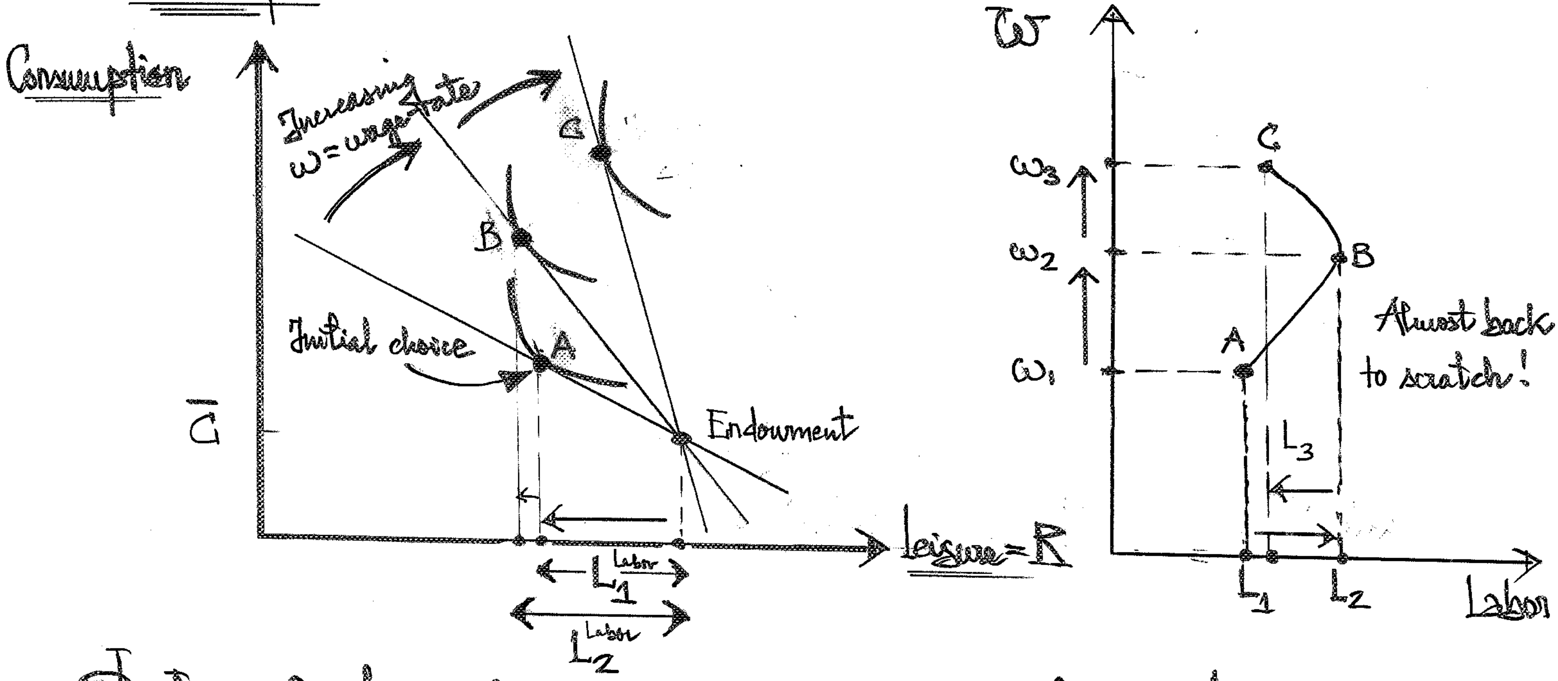
Oppgave 5 Arbeidsmarkedet – Slutsky

$$\frac{\Delta R}{\Delta w} = \frac{\Delta R^s}{\Delta w} + (\bar{R} - R)\frac{\Delta R}{\Delta m}$$ (Varian, pp. 174–177)

$$? = \underset{\text{(subst. effect)}}{(-)} + \underbrace{(+)\ (+)}_{\text{(ordinary income \& endowment income effects)}}$$

Ambiguity w.r.t. total supply of labor ... !

Example: Let $\Delta w > 0$



Backward-bending supply curve of labor !

⟨Varian pages 176–177; figure 9.9⟩

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Oppgave 6

NPV = net present value ; PV = present value

$$PV_0 = \frac{200}{(1.12)^1} + \frac{350}{(1.12)^2} = 178.57 + 279.02 = \underline{457.59}$$

PV(fremtidige kont.strømmer) $< I_0 \Rightarrow$ forkast!

$$NPV = -I_0 + \left[\frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2}\right] = -I_0 + PV_0$$

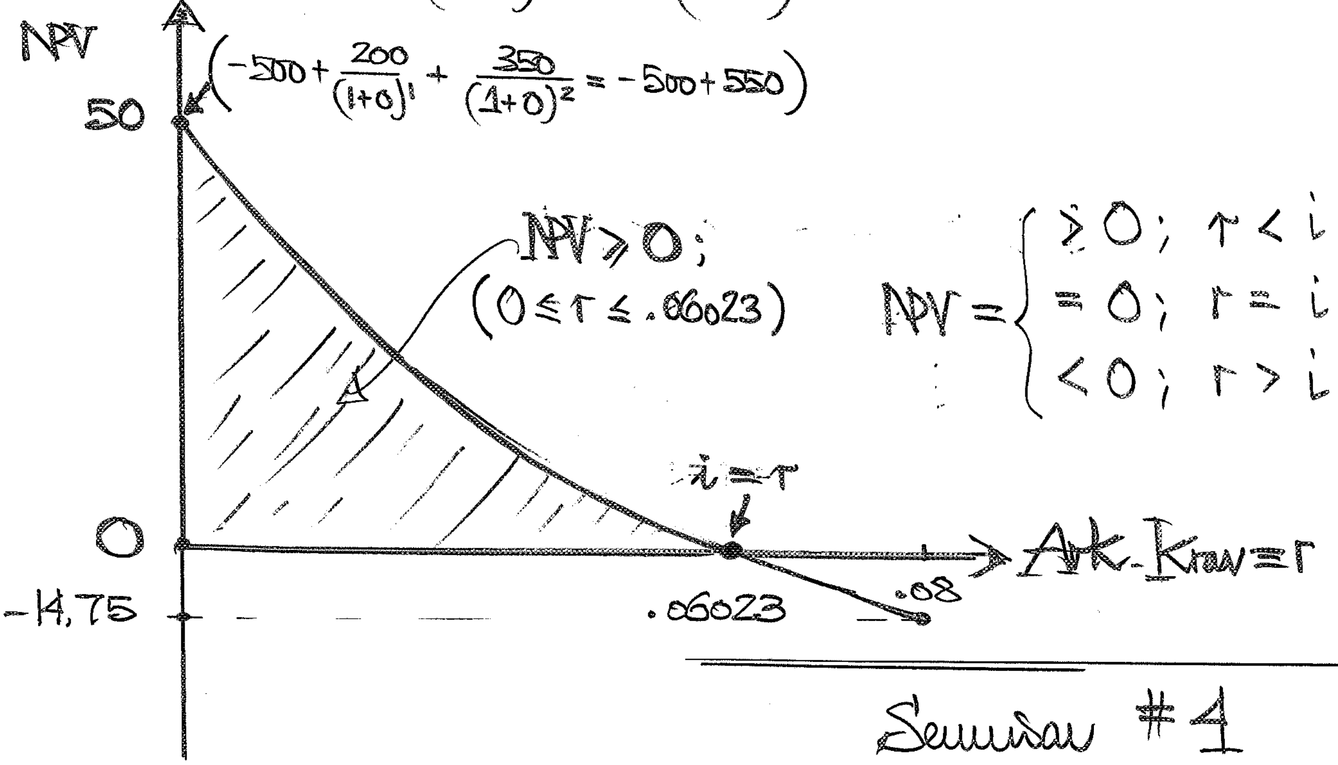
$$C_i = (M_i - I_i)$$ (Varian, pp. 182-187)

Oppgave 7 Internrenten som avkastningskrav

$$NPV = \underline{0} \Rightarrow -I_0 + \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} = 0$$

$$= -I_0 + PV_0$$

$$-500 + \frac{200}{(1+i)^1} + \frac{350}{(1+i)^2} = \underline{0} \Rightarrow \underline{i = 6.023\%}$$



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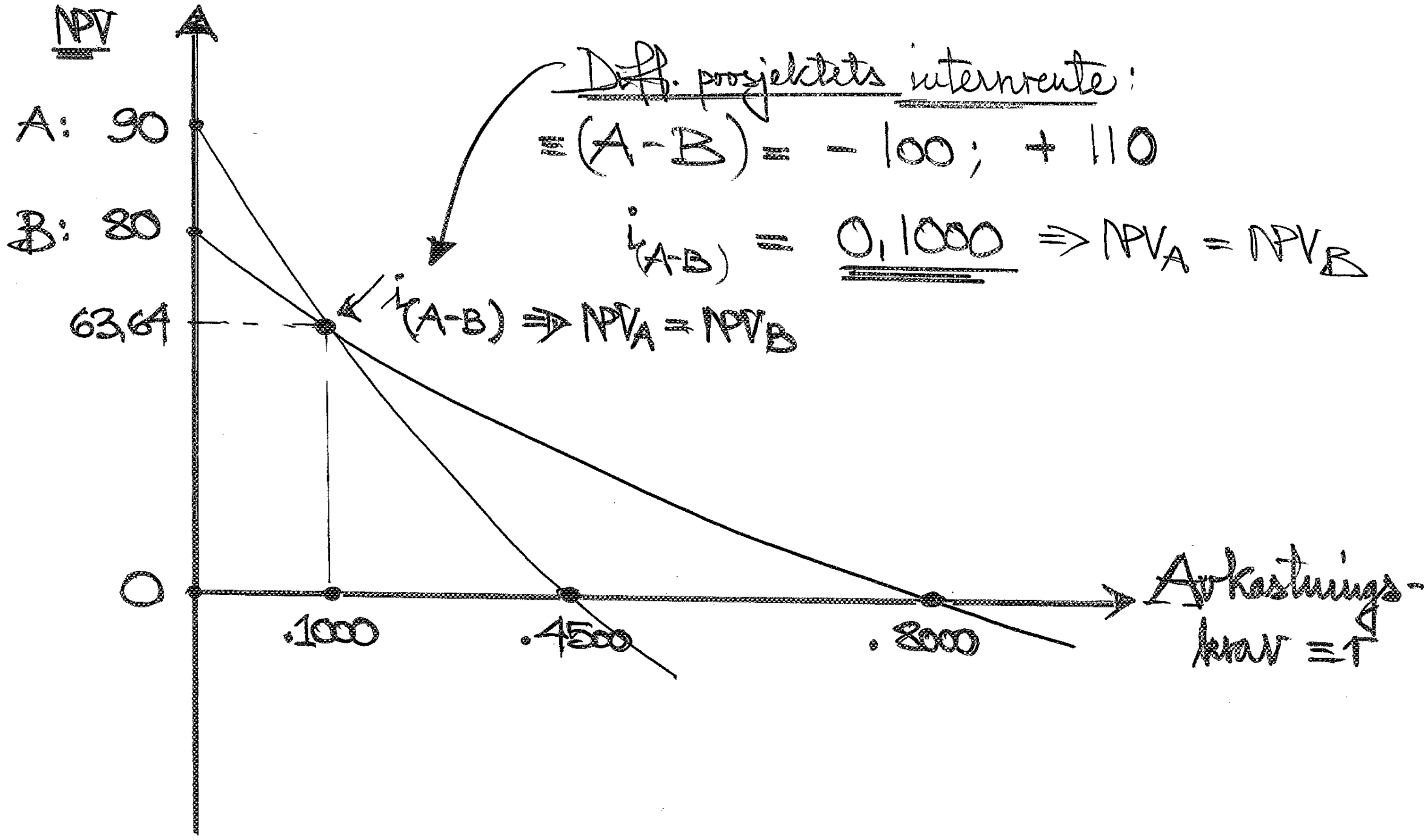
Oppgave 8 "Differanseprosjektets internrente"

$$i_A \Rightarrow -200 + \frac{290}{(1+i)^1} = \underline{0} \Rightarrow i_A = \underline{\underline{0{,}45}}$$

$$i_B \Rightarrow -100 + \frac{180}{(1+i)^1} = \underline{0} \Rightarrow i_B = \underline{\underline{0{,}80}}$$



$$NPV_A \,|\, r = 0{,}10: \; -200 + 290(1.10)^{-1} \approx \underline{63{,}6}$$

$$NPV_B \,|\, r = 0{,}10: \; -200 + 180(1.10)^{-1} = \underline{63.6}$$

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Decision "profit-max;"

$0 \leq r < 0.10 \Rightarrow$ project A

$r = 0.10 \Rightarrow$ indifference

$0.10 < r \leq 0.80 \Rightarrow$ project B

$r > 0.80 \Rightarrow$ neither project

$\Rightarrow$ %

Turn!

Oppgave 9

① $PV = \frac{\cancel{X}}{(1+r)^1} + \frac{\cancel{X}}{(1+r)^2} + \frac{X}{(1+r)^3} + \dots + \frac{\cancel{X}}{(1+r)^{T-2}} + \frac{\cancel{X}}{(1+r)^{T-1}} + \frac{X}{(1+r)^T}$

② $PV(1+r) = X + \frac{\cancel{X}}{(1+r)^1} + \frac{\cancel{X}}{(1+r)^2} + \dots + \frac{\cancel{X}}{(1+r)^{T-3}} + \frac{\cancel{X}}{(1+r)^{T-2}} + \frac{\cancel{X}}{(1+r)^{T-1}}$

② - ① = endelig geometrisk rekke som konvergerer

$$PV(1+i) - PV = \bar{X} - \frac{\bar{X}}{(1+r)^T}$$

$$PV(1+r-1) = \bar{X}\left[1 - \frac{\bar{X}}{(1+r)^T}\right] = \bar{X}\left[\frac{(1+r)^T}{(1+r)^T} - \frac{1}{(1+r)^T}\right]$$

$$\Rightarrow PV = \bar{X}\left[\frac{(1+r)^T - 1}{r(1+r)^T}\right]$$

$$= 50\left[\frac{(1.0625)^{20} - 1}{.0625(1.0625)^{20}}\right] = 50\left[\frac{2.3619}{0.2101}\right] = \underline{\underline{562,05}}$$

present value of future interest payments

Add $PV(1000 \mid T = 20;\ r = 0{,}0625)$

$$= \frac{1000}{(1.0625)^{20}} = \underline{\underline{297.46}}$$

$$\sum 562{,}05 + 297{,}46 = \underline{\underline{859{,}51}} = \underline{\underline{PV_0(\text{obligasjon})}}$$