Econ 532
SS '08
Take-home exam – key

A1. $TR = P_x Q_x + P_y Q_y$

A2. $TR = (2.00)(1{,}000) + (4.00)(2{,}000)$
$= 2{,}000 + 8{,}000$
$TR = 10{,}000$

A3. Complements. Because E_c (Q_y with respect to P_x) < 0. $E_c = \frac{\% \Delta Q_y}{\% \Delta P_x}$
$\Rightarrow$ If $\downarrow P_x$ ($\Rightarrow \uparrow Q_x$) and $\uparrow Q_y$ ($- \% \Delta P_x \Rightarrow + \% \Delta Q_y$)
$\Rightarrow$ if buy more X, also buy more Y

A4. $E_x = \frac{\% \Delta Q_x}{\% \Delta P_x} \Rightarrow -.4 = \frac{\% \Delta Q_x}{-20} \Rightarrow \% \Delta Q_x = +8$
$\Rightarrow$ new $Q_x = (1.08)(1000) = 1080$
$20\% \downarrow P_x \Rightarrow$ new $P_x = (.8)(2.00) = 1.60$
$\Rightarrow$ new $TR_x = (1.60)(1080) = 1728$

$E_c = \frac{\% \Delta Q_y}{\% \Delta P_x} \Rightarrow -.5 = \frac{\% \Delta Q_y}{-20} \Rightarrow \% \Delta Q_y = +10$
$\Rightarrow$ new $Q_y = (1.10)(2000) = 2200$
$\Rightarrow$ new $TR_y = (4.00)(2200) = 8800$

$\Rightarrow$ new TR_{x+y} = new TR_x + new TR_y
new $TR_{x+y} = 1728 + 8800 = 10{,}528$

A5. While it is true that a lower P_x will $\downarrow TR_x$ if $E_x < 1$, that $\downarrow TR_x$ could be offset by a greater $\uparrow TR_y$ if the E_c results in sufficiently greater sales of TR_y. Note in A4, $\downarrow TR_x = 272$ while $\uparrow TR_y = 800 \Rightarrow$ net $\uparrow TR$ of 528 (10,528 vs 10,000)

B1. $\text{slope} = \dfrac{\Delta\,\text{debt}}{\Delta\,\text{yrs}} = \dfrac{\text{Debt}_2 - \text{Debt}_1}{\text{YR}_2 - \text{YR}_1}$

$$\text{slope in graph B} = \frac{3410-712}{2000-1980} = \frac{+2698}{+20} = +134.9$$

$$\text{slope in graph C} = \frac{3410-712}{2000-1980} = \frac{+2698}{+20} = +134.9$$

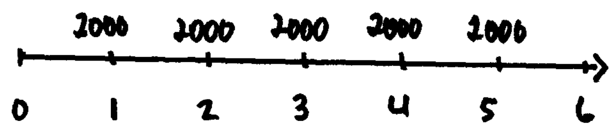
slope meaning: between 1980 and 2000 the incremental U.S. government debt was \$134.9 bil per yr (ie. debt increased at a rate of \$134.9 bil per yr)

B2. The mathematical calculation of slope does NOT yield a smaller or flatter slope in graph C vs graph B. The visual/graphical appearance of slope depends on the 'scale' used to plot the data while the actual economic interpretation or value of slope does NOT depend on graph 'scales'.

B3. A graph, like B, with a steeper slope visually (vs C) gives the impression that debt has been increasing rapidly (at least moreso than graph C). To give this impression (get this appearance), one would keep the years closer together on the horizontal axis ⇒ use a smaller 'scale' to represent a given amount of time.

C1. The marginal (or incremental) cost of constructing buildings up (tall) vs out (wide) is lower. A logical explanation of this would be the high cost of land or real estate makes the MC of building 1-2 story buildings > MC of building a high-rise complex with the same amount of office space.

C2. (500 gal per yr) × ($4.00 per gal) = $2000 per yr saved



if $r = 8\%$, $PV = 2000\,(PVIFA_{.08,5})$

⇒ PV of gas savings = 2000 (3.9927) = $7985

C3. Recommendation will depend on assumed values (V) of each car at the end of the 5th year. To recommend A, the PV of the extra value of A ($= EV_A = V_A - V_B$) would have to be greater than the extra cost of A initially (= $5000) plus the present value of the extra gasoline cost (= $7985) = $12,985 combined. A future $ amount that in 5 yrs is equivalent to $12,985 today, $r = 8\%$,

$\Rightarrow PV = FV\,(PVIF_{.08,5})$

$\Rightarrow 12{,}985 = FV\,(.6806)$

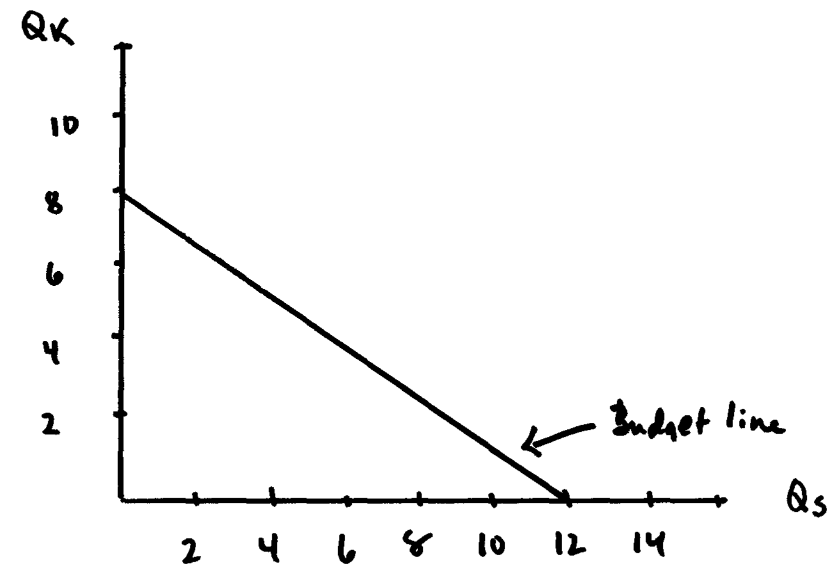
$\Rightarrow FV = 12{,}985 / .6806 = \$19{,}079$. Thus A would need to have an expected value in 5 yrs that is $19,079 greater than B to make A the preferred purchase (i.e. A will have to hold its resale value much better).

C4. = Suggestion(s) to save $30/month for a household.

$\Rightarrow 48 = 4Q_S + 6Q_K$

$\Rightarrow$ with Q_K on vert. axis, $6Q_K = 48 - 4Q_S$

$\Rightarrow Q_K = 8 - 2/3\, Q_S$

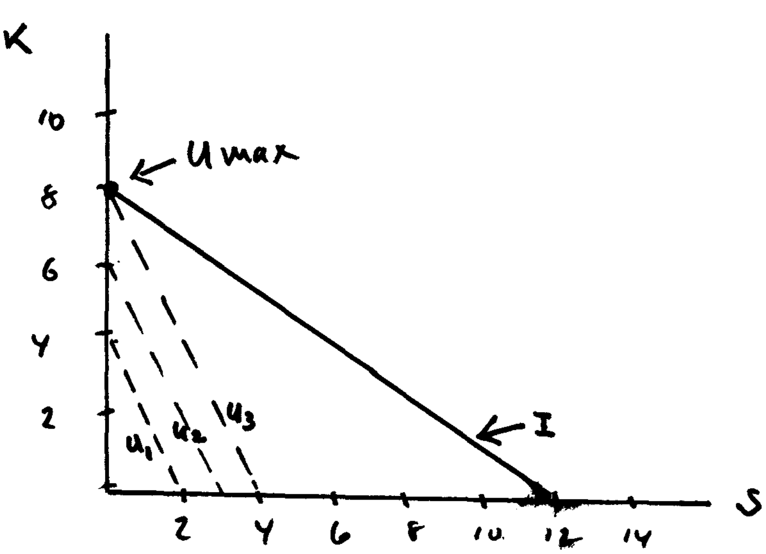


D2. Perfect substitutes and willing to exchange 2S for 1K $= \frac{\Delta K}{\Delta S} = \frac{1}{2}$

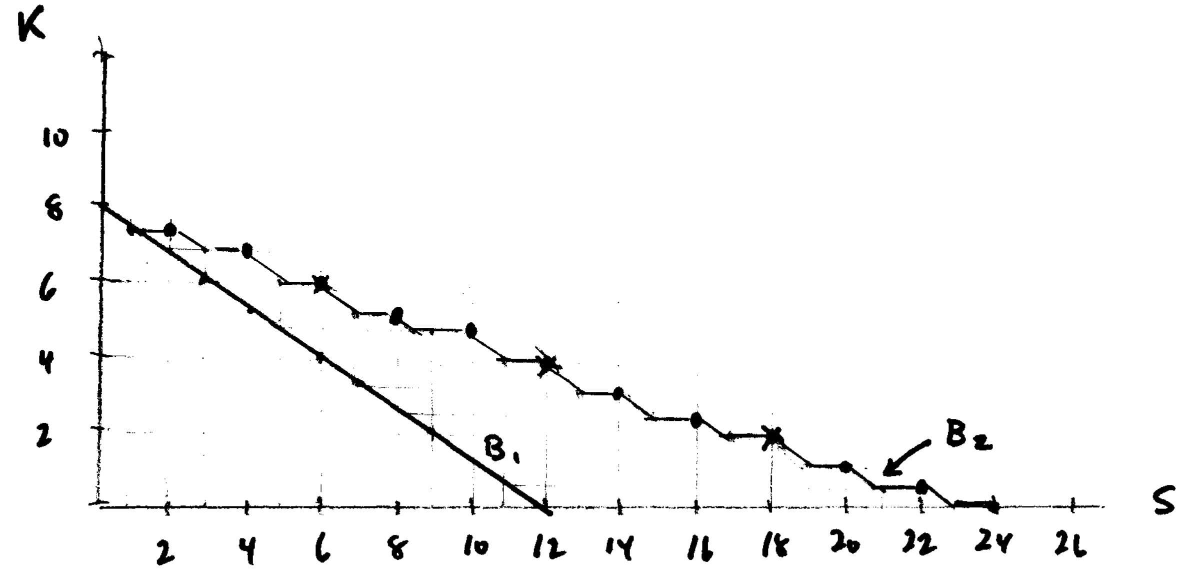
$\Rightarrow$ indifference curves are linear with slope $= 1/2 = MU_S / MU_K$

$\Rightarrow$ slope of indiff. curves < slope of budget line

$\Rightarrow \frac{MU_S}{MU_K} < \frac{P_S}{P_K} \Rightarrow \frac{MU_S}{P_S} < \frac{MU_K}{P_K} \Rightarrow$ buy all K



D3.



Note: new budget line will be a 'stepped' budget line

It passes through $S=6$ (buy 3, get 3 free), $K=6$
$S=12$ (buy 6, get 6 free), $K=4$
$S=18$ (buy 9, get 9 free), $K=2$
} each at a cost of \$48

D4. a) $Q_s = 1000 - 200P_s + 50P_K$

$\Rightarrow Q_s = 1000 - 200(4.00) + 50(6.00) = 1000 - 800 + 300 = 500$

b) If $P_s = 4.00 \Rightarrow Q_s = 200 + 50P_K$

$E_c = \frac{\partial Q_s}{\partial P_K} \cdot \frac{P_K}{Q_s} = +50\left(\frac{6.00}{500}\right)$ at $P_K = 6.00$

$E_c = +.6 \Rightarrow$ for each 1% ΔP_K, Q_s will Δ .6% in the same direction

c) if $P_K = 6.00 \Rightarrow Q_s = 1000 - 200P_s + 50(6.00)$

$\Rightarrow Q_s = 1300 - 200P_s \Rightarrow P_s = 6.50 - .005Q_s$

Max TR occurs at midpt $\Rightarrow P_s = 3.25$

d) if $P_K = 5.00 \Rightarrow Q_s = 1000 - 200P_s + 50(5.00)$

$\Rightarrow Q_s = 1250 - 200P_s \Rightarrow P_s = 6.25 - .005Q_s$

$\Rightarrow$ new D_s shifts parallel to left, new vert. axis intercept $= 6.25$ (0.25 lower)