NAME AND ID: J. BIEBER

II. PROBLEM

You must answer the following questions within the space provided. Your answers must be accompanied with clear explanations. Graphs and equations without explanations will not get you far.

- 1. A theory of intertemporal choice (35 points) Suppose that Penelope lives two periods only, $t \in \{1,2\}$. Y_{dt} is her disposable income at period t and W_1 is her initial wealth at period 1. She can save or borrow at interest rate t and cannot leave a bequest or unpaid debt after period 2. C_t is her consumption level at period t.
- a) (15 points) Let S_1 represent the savings level in period 1. Write down the two separate equations representing consumption levels at period 1 and period 2 respectively. Combine these two equations in order to represent the intertemporal budget constraint and show that it can be interpreted as an equality between the present discounted value of consumption levels and the present discounted value of available resources. Explain each mathematical step <u>in words</u>.

[A] C, = \(\), + \(\), - \(\), : Consumption at period \(\) in equal to all avails, resources at to minus (navings).

[B] C_2 = (+/r) S, + \(\) + \(\) 2: Consumption at t = 2 equals its singorable income plus (navings augmented by the interest frate (nave from [A]: S, = \(\) \(\), + \(\), - C, \\

Check have from [A]: S, = \(\), + \(\), - C, \\

C2 = (+/r) (\(\)/_{31} + \(\), - C, \) + \(\), 2

Rearranging gives:

C3 C, + C2 = \(\)/_{31} + \(\), + \(\)/_{42}

The lift-hand side of [C] in the print (natural of consumption quality the R.H.S. is the P.V. of available resources.

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b)(10 points) With the help of a graphical analysis, concoct an example in which a decrease in the rate of interest leads Penelope to go from a net saver to a net borrower. (Assume convex indifference curves.) Interpret your results as completely as possible while remaining clear and

concise. CR

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c) (10 points) Take the following values: $Y_{1d} = 30,000\$$, $Y_{2d} = 40,000\$$, $W_1 = 10,000\$$ and r = 10%. Suppose that Penelope wants to have a consumption level equal to 35,000\$ in period 2. How much should she save? Explain your steps.

	$C_2 = (+1)(Y_{d1} + W_1 - C_1) + Y_{d2}$
1	35 = (.1)(30 + 10 - C,) + 40
	Using the IBC, we set Cz = 35000 and
	then find the consumption at t=1
	that corresponds, solving thru gives
	C, = 44 545
	We they have the following
	ravings at t:1:
	S, = Yd+W, -C, = 30+10-44.545=-4545#
	The consumer is a met borrouses
	at t=1 since he consumer lass
	Than the sisposable income at t = 2.

2. The Solow model (35 points)

a) (20 points) A country is described by the Solow model, with a production function of $y = k^{1/3}$. Suppose that today, k is equal to 600. The fraction of output invested is 30% and the depreciation rate is 2%. How does the output per worker today compare with the steady-state one? Explain your conclusion.

Angutoment is i = 8 h = 0,3. (600) = 2.53

Deprecation is a = 8 h = 0.02. 600 = 12

The total hange in capital is

there: \(\text{A} = \text{i} - \d = 2.53 - 12 = -9.47 < 0

Since the stock of capital is

b) (15 points) Suppose that the national production function for the Canadian economy can be expressed as $Y = AK^{\alpha}L^{1-\alpha}$, where each variable is as described in class. Explain how one could estimate the value of parameter α for Canada. Be as complete as possible while remaining clear and concise. An a competitively market for capital fits fetures must be expected for its marginal product, i.e. $z = MPK \Rightarrow b = xAK^{\alpha-1}/\sqrt{x}$. This implies Find the company of the company of the parameter of applicable form while fair the company of the parameter of applicable form must be estimated by tradeculations for the fair of applicable form mumbers are capity found in plople is smoothly found in the component of the fillings.	decreasing this means that
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