

YOU MUST USE THIS AS A TEMPLATE - THAT IS - MAKE SPACE FOR YOUR ANSWERS BY HITTING ENTER (you certainly don't need to type this assignment)- LEAVE THE QUESTIONS AS THEY ARE - AND PLEASE STAPLE! NOTEBOOK PAPER (OR ANY PAPER) STAPLED TO THE BACK IS NOT ACCEPTABLE. ALSO, PLEASE PUT THE FIRST TWO LETTERS OF YOUR LAST NAME IN THE TOP RIGHT HAND CORNER OF THIS PAGE SO THAT WE CAN ALPHABETIZE THESE EASILY. THANKS IN ADVANCE!

Economics 304

Homework #4 - Desired Capital, User Cost and Goods Market Equilibrium
Due Wednesday, 10/3 at the beginning of class - no late papers accepted!

Instructions: Please show all work or points will be taken off. Good luck!

1. PART 1 (35 points total - 5 points for each part and 10 points for the diagram) You own a golf course in Florida and you need to determine how many golf carts you need to buy to maximize profits. Please answer the following questions given the information below.

A brand new golf cart costs 400 rounds of golf and the rate of depreciation is 18% (.18).

The real interest rate is 2% (use .02 in calculations).

The expected marginal product of capital is given by $MPK^t = 500 - 5K$.

a) What is the user cost of capital and what is it expressed in??

$$UC = \frac{(r+d)(1-t)P_K}{1-t}$$

$r = .02$ $d = .18$ $P_K = 400$
 $t = 0$ $ITC = 0$

$$= (.2)(400)$$

$UC = 80$ rounds of golf

b) How many golf carts should you buy to maximize profits (i.e., what is K^*)?

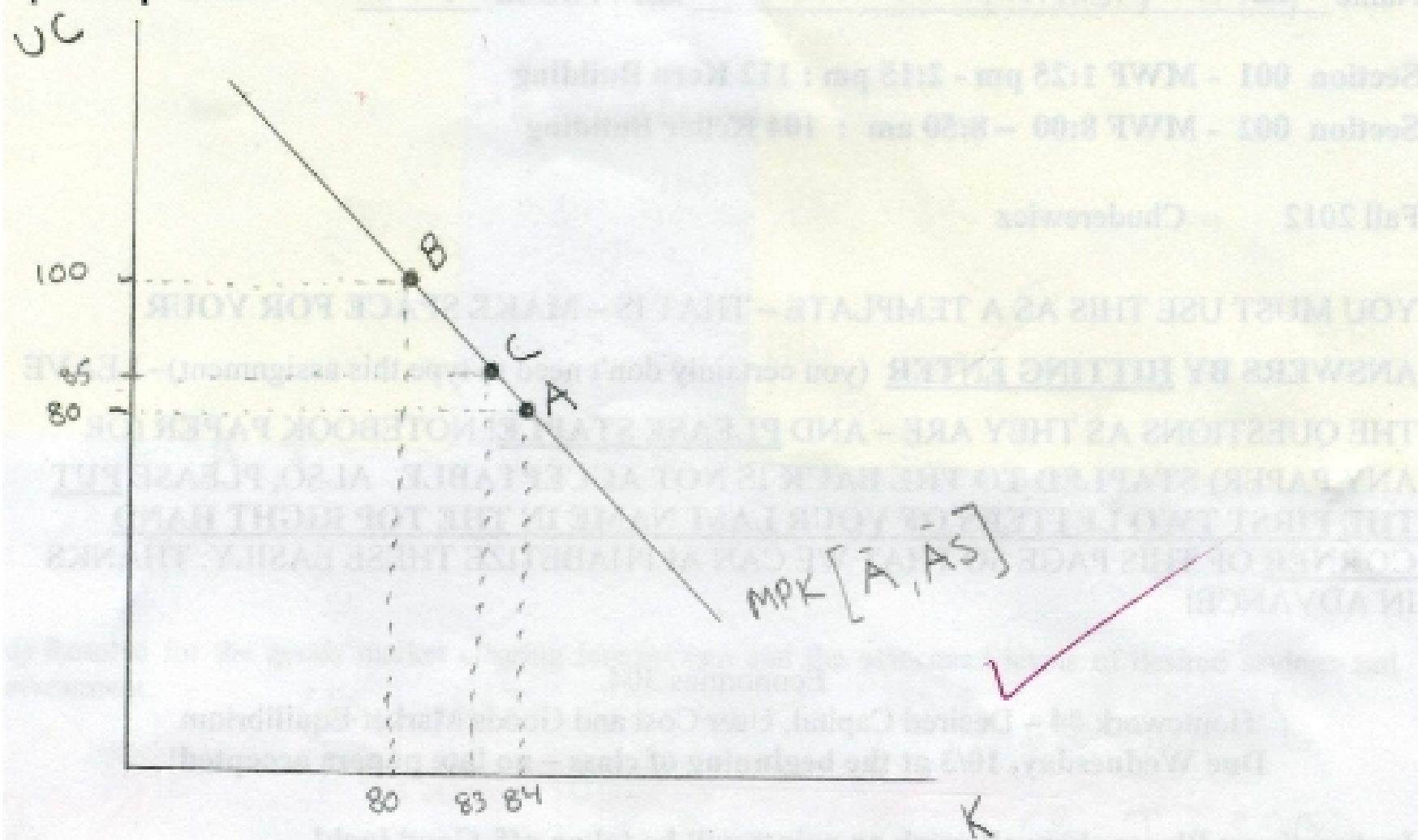
$UC = MPK$

$80 = 500 - 5K^*$

$5K^* = 420$

$K^* = 84$ golf carts

Draw a graph (the uc / MPK graph) depicting the state of affairs and label this initial profit maximizing point as point A.



A completely labeled and correct graph is worth 10 points.

c) Now suppose the (local) government with all their financial shortfalls embarks on a campaign to raise revenue to fund the fire department by imposing a so-called "luxury tax" (we know it as τ) equal to 20% of gross revenue. What happens to the profit maximizing number of golf carts? Please show all work and label as point B on your uc/MPK graph.

$$UC = \frac{(.2)(400)}{.8}, \quad 1-t = 1-.2 = .8$$

$$UC = 100$$

$$100 = 500 - 5K_B^*$$

$$400 = 5K_B^*$$

$$K_B^* = 80 \text{ golf carts}$$

d) Now explain why your profit maximizing K^* has changed. Please be specific using the firm's profit maximizing condition (explain the intuition!). Start your answer with "If I did not change my capital input (my K^*), then I would not be(you can finish the rest!)"

If I did not change my capital input (my K^*), then I would not be following my profit maximizing condition (uc). The 81st, 82nd, 83rd, and 84th golf carts, that I was buying previously, are now creating less revenue (MPK) than the cost (uc). I should get down to 80 golf carts, where

$$UC = MPK = 100.$$

e) The Federal government, knowing all about the financial pains encountered by state and local governments given the Great Recession, decide to offer an investment tax credit equal to 15% (this is in addition to the tax already imposed by the local government). What is your desired capital stock (K^*) now? (Hint: An investment tax credit effectively reduces the price of capital to the firm – think of it as this – under the investment tax credit – you buy a golf cart (cost = 400 rounds of golf) and you get a 15% rebate from Uncle Sam so the investment tax credit adjusted price of the golf cart is now 340 rounds of golf $[(1-.15) \times 400 = 340]$. Please show all work again and label this as point C on your uc/MPK diagram.

$$UC = \frac{(r+d)(1-ITC)P_K}{1-t}$$

$$= \frac{(.2)(.85)400}{.8}$$

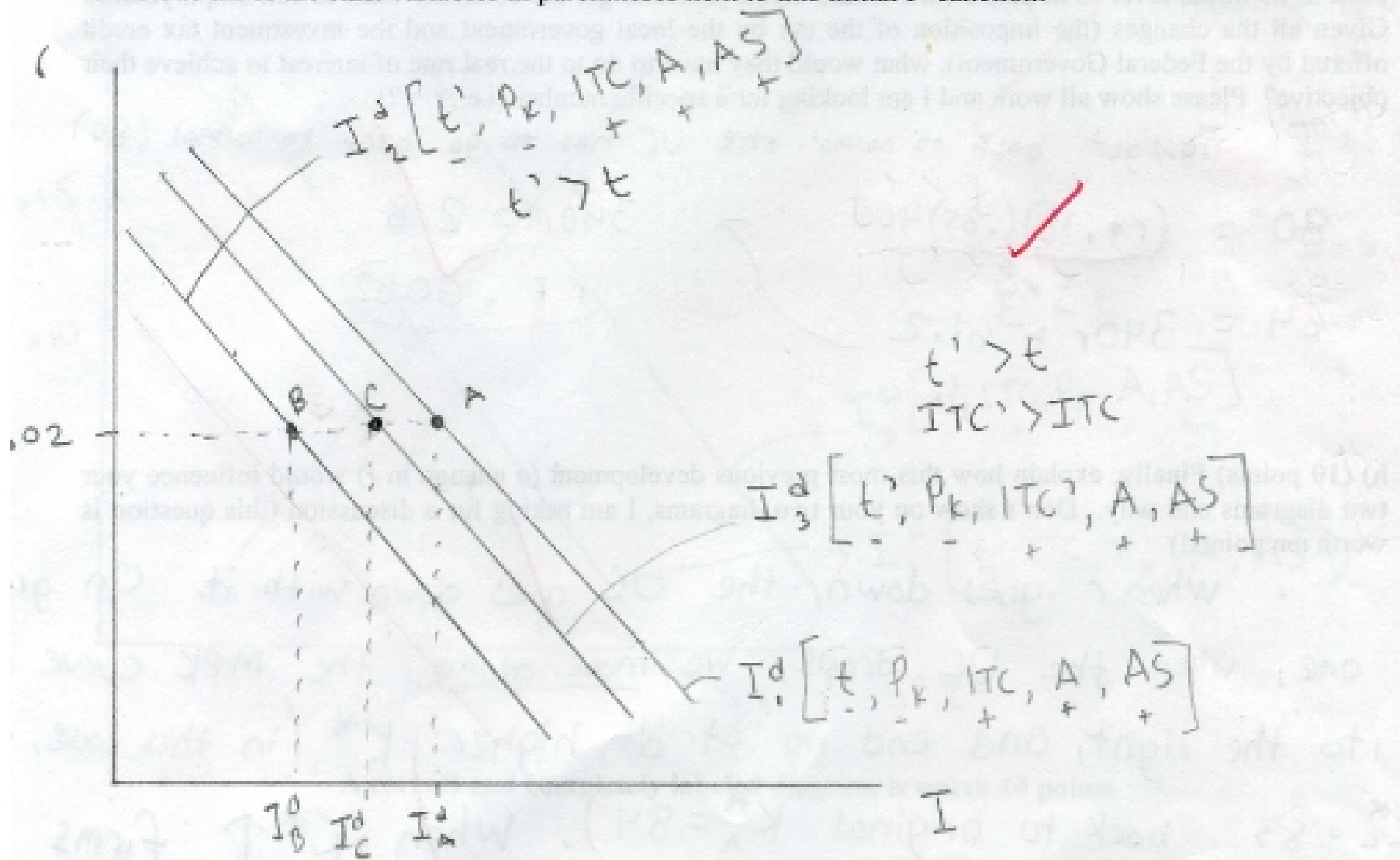
$$UC = 85$$

$$85 = 500 - 5K^*$$

$$5K^* = 415$$

$$K^* = 83$$

1. PART 2 (NEW GRADER – 35 points – 5 for f) and g) 10 for h) and 15 for graph)) Draw a desired investment diagram (completely labeled with all the shift variables noted next to the function in parentheses with signs (+ or -)) depicting the initial equilibrium as point A (simply draw a negatively sloped I^D curve going through point A). Label the initial real interest rate as $r^*_A = .02$ (as is given above) and the initial level of desired investment as I^d_A . Note importantly that we do not have numbers for desired investment, but that's ok, we are focusing on the change in desired investment, given the same real rate = .02. Be sure to include all of the shift variables in parentheses next to this initial I^D function.



A completely labeled and correct graph is worth 15 points.

Then show, as point B, the new level of desired investment, at the same real rate = .02.