

- A. Assume Dolly Nogood is a grade-school student who has a monthly allowance ( $I =$  income) for recess snacks of \$20. In all of the questions below, assume  $S$  is the vertical axis variable and  $I = \$20$ . She is deciding how to spend her income on  $S =$  cans of soda pop and  $C =$  candy bars for which her utility function is given as  $U = S^{1/2}C^{1/2}$ . The price of  $S = \$1.00$  and the price of  $C = \$.50$ .

- 2 pts A1. If Dolly consumes  $S = 10$ , how much  $C$  at a maximum can she consume? What level of utility is Dolly achieving and what is her MRS (soda for candy) at that point?

$$20 = 1S + .5C \Rightarrow S = 20 - .5C \Rightarrow 10 = 20 - .5C \Rightarrow .5C = 10 \Rightarrow C = 20$$

$$U = S^{1/2} C^{1/2} = (10)^{1/2} (20)^{1/2} = (14.14) = U$$

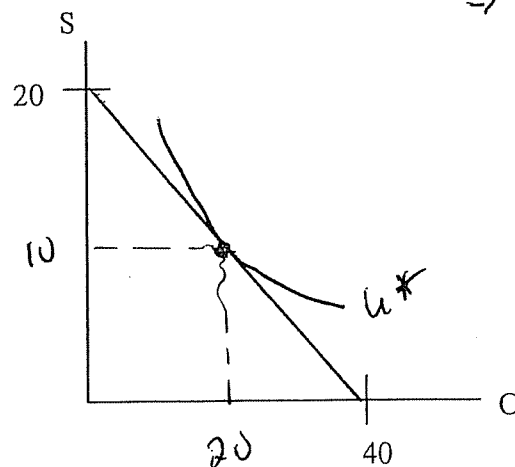
$$MRS = \frac{MU_C}{MU_S} = \frac{1/2 S^{1/2} C^{1/2-1}}{1/2 C^{1/2} S^{1/2-1}} = \frac{S}{C} = \frac{10}{20} = 1/2 = MRS$$

- 2 pts A2. Show Dolly's 'equal slopes condition' for maximizing her utility is  $C = 2S$ .

$$\hookrightarrow \Rightarrow \frac{MU_C}{MU_S} = \frac{P_C}{P_S}$$

$$\Rightarrow \frac{S}{C} = \frac{.50}{1.00} \Rightarrow C = 2S$$

- 2 pts A3. Show mathematically and graphically (in graph below), the attainable quantities of  $S$  and  $C$  that will maximize Dolly's utility?



$\Rightarrow$  plug equal slopes condition  $C = 2S$   
into budget equation

$$\Rightarrow 20 = 1S + .5C$$

$$\Rightarrow 20 = 1S + .5(2S)$$

$$\Rightarrow 20 = 1S + 1S$$

$$\Rightarrow 20 = 2S \Rightarrow S = 10$$

$$\Rightarrow C = 20$$

B. Assume Dolly is not going to buy soda and candy but instead she is deciding how to spend her income on  $S$  = cans of soda and  $P$  = bags of popcorn for which her utility function is given by  $U = \min [10S, 5P]$ . The price of  $S = \$1.00$  and the price of  $P = \$.50$ .

2 pts B1. What attainable quantities of  $S$  and  $P$  will maximize Dolly's utility?  
 = pt of intersection between budget line and pts where  $10S = 5P$   
 $\Rightarrow 10S = 5P \Rightarrow S = \frac{1}{2}P$   
 $20 = 1S + 0.5P$   
 $\Rightarrow 20 = 1P \Rightarrow S = \frac{1}{2}P$

2 pts B2. Show your answer to B1 in the graph below.  $= \frac{1}{2}(20)$   
 $= 10$

