Chapter 3: In Class Problem

If Paul s'utility for two goods, popcorn and soda is given by $U(p,s) = 10p^2 s$ find his optimal consumption bundle (that is, what quantity of popcorn and soda will he purchase) if his income is \$15, the $P_{soda} = \$0.50$, and the $P_{popcorn} = \$1.00$.

We want to Max $U(p,s) = 10p^2 s$

Subject to the budget constraint

Step 1: Find the BC

$P_p P + P_s S = I$ à $P + ½S = 15$

Step 2: Solve BC for P or S (looking at Utility, it will be easier to solve for S)

½ S = 15 ~~P~~ à S = 30 ~~2~~P

Step 3: Substitute this into Utility

$U = 10P^2(30 \cancel{2}P)$ à $300P^2 \cancel{2}0P^3$

Step 4: Find the derivative of utility with respect to P ($\frac{dU}{dP}$) and set equal to 0:

$$\frac{dU}{dP} = 600P - 60P^2 = 0$$

Step 5: Now solve for P:

$$600P = 60P^2$$

$$P^* = 10$$

Step 6: Substitute P into the BC to find S:

S = 30 ~~2~~P

$S^* = 30 \cancel{2}*10 = 10$