Practice Problems Answer:

1) Max U(B, S) = B*S
s.t. $P_B B + P_S S = I \rightarrow 2B + S = 20$

First, rearrange the budget constraint → S = 20 – 2B
Second, substitute the budget constraint back into the utility → Max B*(20 – 2B)

Now, maximize utility (take the derivative with respect to B)

$$\frac{dU}{dB} = 20 - 4B = 0$$

$$B = 5$$

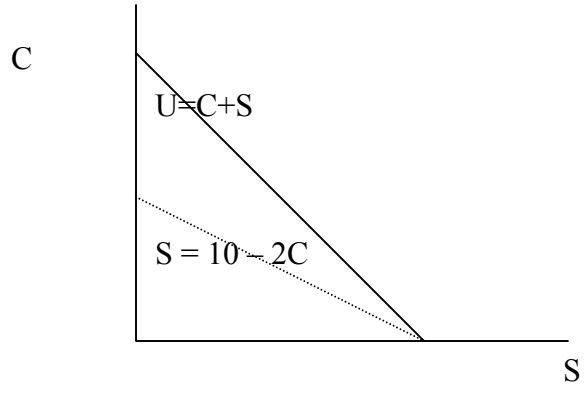
Finally, substituting this back into the budget constraint, we find the optimal amount of soda to purchase: S = 20 – 2*5 = 10

It is optimal to purchase 5 burgers and 10 sodas

2) Max U(C,S) = C + S
s.t. $P_C C + P_S S = I \rightarrow 2C + S = 10$

Here, mathematically we cannot use derivatives to solve this (the goods are "perfect substitutes").

Graphically



Since coffee and soda are perfect substitutes and coffee is twice as expensive as soda, the best outcome is to purchase 10 sodas and 0 coffees. This is a corner solution; if we stay within our income ($10), U above represents the highest indifference curve we can be on.