Econ 301 - Problem Set 8

Question 6

Z = pizza, C = cola

$$U_A = Z_A C_A$$
$$U_S = Z_S^{0.5} C_S^{0.5}$$
$$e_A = (10, 20)$$
$$e_S = (20, 10)$$

(a)

$$MRS_A = -\frac{U_Z^A}{U_C^A} = -\frac{C_A}{Z_A}$$

$$MRS_S = -\frac{U_Z^S}{U_C^S} = -\frac{\frac{1}{2} Z_S^{-1/2} C_S^{1/2}}{\frac{1}{2} Z_S^{1/2} C_S^{-1/2}} = -\frac{C_S}{Z_S}$$

(b)

$$MRS_A = MRS_S$$

$$\frac{C_A}{Z_A} = \frac{C_S}{Z_S}$$

$$Z_S = 30 - Z_A, \qquad C_S = 30 - C_A$$

$$\frac{C_A}{Z_A} = \frac{30 - C_A}{30 - Z_A}$$

$$C_A(30 - Z_A) = Z_A(30 - C_A)$$

$$30C_A - Z_A C_A = 30Z_A - Z_A C_A$$

$$30C_A = 30Z_A \;\Rightarrow\; C_A = Z_A$$

$$Z_A = 30 - Z_S$$
$$C_A = 30 - C_S$$
$$\frac{30 - C_S}{30 - Z_S} = \frac{C_S}{Z_S}$$

$$Z_S(30 - C_S) = C_S(30 - Z_S)$$

$$30Z_S - Z_S C_S = 30C_S - Z_S C_S$$

$$30Z_S = 30C_S$$

$$C_S = Z_S$$