Question 1

(a) Then

The value of his endowment is 720.

(b) \( \text{MRS} = \frac{x_t}{2x_e} = \frac{3}{2} \) implies \( 3x_e = x_t \). The budget line equation is \( 3x_e + 2x_t = 720 \). Thus,

\[
x_e = 80, \ x_t = 240.
\]

Question 2

\( \text{MRS} = \frac{x_2}{4x_1} = 1 \). Thus,

The equation of the income offer curve is \( x_2 = 4x_1 \).

In addition, \( x_1x_2^4 = 8,192 \). Thus, \( x_1(4x_1)^4 = 8,192 \).

The expenditure minimizing consumption is

\[
x_1 = 2, \ x_2 = 8.
\]

The person needs $20.

Question 3

\( \text{MRS} = \frac{c_2}{0.9c_1} = 1.2 \). Thus, the income offer curve is \( c_2 = 1.08c_1 \).

The budget line equation is \( 1.2c_1 + c_2 = 4,000(1.2) + 13,440 = 18,240 \). Thus, \( 2.28c_1 = 18,240 \). Therefore,

Joe’s consumption is \( c_1 = 8,000, \ c_2 = 8,640 \).

This year, Joe borrows $4,000

Suppose Joe’s credit card has a credit limit of 2,000 Dollars, and he cannot get credit from any other source. Then

Joe borrows $2,000

Question 4

\( \text{MRS} = \frac{c}{R} = w \). Before tax, \( c = 40R \). The budget line equation is \( 40R + c = 4,000 + 200 = 4,200 \). Thus, \( 80R = 4,200 \), i.e., \( R = 52.5 \).

After tax, \( c = 20R \). The budget line equation is \( 20R + c = 2,000 + 200 = 2,200 \). Thus, \( 40R = 2,200 \), i.e., \( R = 55 \).

The person’s labor supply before the tax is introduced is

47.5

The person’s labor supply after the tax is introduced is

45
Question 5  MRS = \( c/R = 20 \), i.e., \( c = 22.5R \). In addition, \( Rc = 36,000 \) in order for utility to be at the after-tax level. Thus, \( 22.5R^2 = 36,000 \), i.e.,

\[
R = 40, \; c = 900
\]

The value of this consumption at prices \( w = 22.50 \) and 1 is \( \$1,800 \).

\[
wR = 2,700 \text{ when } w = 22.5.
\]

Thus, the loss to the person is 900.

Total tax revenue is 50(4.4) = 750. The deadweight loss is therefore 150. Thus, the deadweight loss is 20% of the tax revenue.

Question 6

After tax utility is 40.

In order to obtain the after-tax utility at before-tax prices \( (p_1 = 5, \; p_2 = 2) \) the person’s income would have to be \( m = 80 \).

Thus, the deadweight loss generated by the tax is 120.

The government’s tax revenue is 0.

Question 7  The expected utility from playing the lottery is 3.89607.

The lotteries’ certainty equivalent is 49.308. Thus, playing the lottery is equivalent to losing 61 cents with certainty.