Question#65485

Suppose that Billy's preferences over baskets containing milk (good x), and coffee (good y), are described by the utility function $U(x; y) = xy + 2x$. Billy's corresponding marginal utilities are, $MUx = y + 2$ and $MUy = x$.

Use Px to represent the price of milk, Py to represent the price of coffee, and I to represent Billy's income.

Suppose that $Px = \$1$ and $I = \$40$. Find the equivalent variation for an increase in the price of coffee from $Py1 = \$4$ to $Py2 = \$5$.

Solution: The budget constraint is: $p_x x + p_y y = I$. Or: $x+4y=40$. In the point of the local consumer market equilibrium the following equation must be implemented:

$MUx / MUy = Px/Py$.

So, before an increase in the price of coffee we have the next equation:

$(y+2)/x=1/4$. So, $x=4(y+2)$.

After substitution of the last expression to the budget constraint we obtain the following: $4(y+2)+4y=40$, $8y+8=40$, $y=(40-8)/8=4$.

$X=4(y+2)= 4(4+2)=24$.

So, the utility maximizing bundle is $x=24$, $y=4$.

After increase in the price of coffee the new budget constraint is: $x^*+5y^*=40$, $(y^*+2)/x^*=1/5$, $x^*=5(y^*+2)$. So, $5(y^*+2)+5y=40$, $10y^*+10=40$, $y^*=3$, $x^*=5(3+2)=25$.

The new utility maximizing bundle is (25;3).

Such the consumption bundle cost before an increase in the price of coffee:

$I^*=x^*+4y^*=25+4*3=37$.

So, the equivalent variation for an increase in the price of coffee from $Py1 = \$4$ to $Py2 = \$5$ is:

$EV=I-I^*=40-37=3$.

Answer: The equivalent variation for an increase in the price of coffee is 3 units of income.

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