Answer on Question #79575, Economics / Macroeconomics

a) With the existing relationship

$$Q=500S + 100U - 0.2S^2 - 0.3U^2$$

And provided hire 400 hours of skilled labour and 100 hours of unskilled labour

We can deduce the value of Q

$$Q = 500*400 + 100*100 – 0.2*400^2 – 0.3*100^2$$
$$Q = 200\,000 + 10\,000 – 32\,000 – 3\,000 = 175\,000$$

And the labor costs for such a release:

$$400 * 15 = 6\,000$$
$$100 * 5 = 500$$

Conclusion: for a given number of hours, we get output ***Q = 175 000* for 1 hour and labor costs of *$6,500*.**

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b) With labor costs of ***$ 5,000***, we get a relationship:

$$15 * S + 5 * U = 5\,000,$$

Or

$$3S + U = 1\,000$$
$$U = 1\,000 – 3S$$

Provided that the number of hours of labor can not be negative, we get the following answers:

[1; 997] – 1 hour of skilled labor and 997 unskilled labor;
[2; 994]
…
[333; 1] – 333 hours of skilled labor and hour of unskilled labor.

But with the indicators of skilled labor less than 122 hours, index of *Q* will be negative. So, we get the following answers: [122; 634], [123; 631], [124; 628]…[333;1].

Total 212 options for the use of skilled and unskilled labor at a total cost of ***$ 5,000.***

At the same time - with the growth of hours of skilled labor production (*Q*) growth is also observed: from ~ 836 (S = 122, U = 634) to ~ 144 421 (S = 333, U = 1).

Conclusion - with labor costs of ***$ 5,000***, the maximum production figure (*Q*) corresponds to the maximum use of skilled labor and the minimum use of unskilled labor and is ~ 144421****.***

c) The relationship between production and hours of labor characterizes the indicator of labor productivity. In this pattern, the price indicator does not affect the value of others.

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* These indicators can be output through the graph of the constructed function or manually.