# Economics & Econometrics: second-round sample tasks

**You will be asked to complete 33 second-round tasks. They include:**
**• *20 entry-level tasks (automated assessment)*. Each task has one correct answer worth 1 point. The maximum score is 20 points;**
**• *10 intermediate tasks (automated assessment)*. Give your answer as number. Some questions have multiple correct answers altogether worth 5 points. One correct answer out of two is worth 2 points; two correct answers out of three, 3 points. The maximum score is 50 points;**
**• *three advanced tasks (constructed response)*. Each task has a three-stage solution worth 10 points (2 + 4 + 4). The maximum score is 30 points.**

# Part 1. Automated assessment

## 1.1. Entry-level tasks

### Section 1. Economic behavior of consumers and producers

1. Which of the following statements best describes the law of diminishing marginal returns?
a)      As a firm's output grows, the average variable cost of production falls.
b)      As a firm's output grows, the average fixed cost of production goes down.
c)      **As a firm engages more units of a variable input, while keeping all other inputs intact, the marginal product of that input eventually decreases.**
d)      As a firm increases its advertising spending, the demand for its product declines.
Answer: C

2. A firm's total cost is given by TC = 20Q + Q^2, where Q is the quantity of output produced. What is the firm's marginal cost function?
a)      **MC = 20 + 2Q**
b)      MC = 20Q + Q^2
c)      MC = 40Q + 2Q^2
d)      MC = 20
Answer: A

3. Which of the following is a public good?
a)      A private beach club
b)      A movie theater
c)      **A public park**
d)      A restaurant
Answer: C

4.  A firm operates in a perfectly competitive market and can sell its output at a price of $10 per unit. What is its marginal revenue?
a)      **$10**
b)      below $10
c)      over $10
d)      It cannot be determined from the information provided.
Answer: A

### Section 2. Macroeconomics

5. Cost-push inflation develops when
a) there is moderate growth in the money supply.

**b) the prices of natural resources rise.**
c) the prices of consumer goods and services rise.
d) the discount rate decreases.
Answer: B

6. Transactions demand DOES NOT depend on
a) the volume of total production.
b) the velocity of money circulation.
**c) the interest rate.**
d) income.
Answer: C

7. Increasing the money supply simultaneously with decreasing the marginal propensity to save leads to:
a) an increase in the interest rate.
b) a decrease in the interest rate.
**c) an increase in income.**
d) a decrease in income.
Answer: C

8. Autonomous savings
a) are positive.
**b) reflect society's debt in the absence of production.**
c) are independent of autonomous consumption.
d) equal the maximum possible savings at a given income.
Answer: B

### Section 3. Macroeconomic dynamics. Open economy models

9. The main advantages of a fixed exchange rate system is
**a) predictability and certainty.**
b) the ability to pursue an independent monetary policy.
c) the exchange rate acting as an "automatic stabilizer".
d) the exchange rate helping to regulate the balance of payments.
Answer: A

10. Real GDP was USD 500 billion in the base year and 520 billion in the current year. The rate of economic growth is
a) 4.6%.
b) 5%.
c) 6.5%.
**d) 4%.**
Answer: D

11. The form of organization and regulation of currency relations specified in by national legislation or interstate agreements is
a) international monetary and financial relations.
**b) international monetary and financial system.**
c) a gold standard.
d) a multi-currency standard.
Answer: B

12.The introduction of an import duty in a country can lead to
**a) an increase in the profits of domestic firms and a reduction in the profits of domestic households.**
b) a rise in the profits of domestic households and a decrease in the profits of domestic firms.
c) an increase in the profits of both domestic households and domestic firms.
d) a decrease in the profits of both domestic households and domestic firms.
Answer: A

## Section 4. Financial markets and financial instruments

13.What compound annual rate can be used instead of the simple interest rate of 18% (based on a 365-day year) in a banking contract, while ensuring that the financial outcome remains unchanged for the depositor? The operation period is 657 days.
**a) 16.873%**
b) 18.923%
c) 13.24%
d) 1.127%
Answer: A

14. An investor purchased a bond of a nominal value of 1,000 rubles on the secondary market with an 18 ruble discount and sold it with a 9 ruble discount. The annual coupon income is 20%, and the holding period is 3 years. Determine the total yield of the bond for the investor. Give you answer as %.
a) 20.484%
b) 19.45%
c) 20.367%
**d) 20.672%**
Answer: D

15.Calculate the profit or loss of the investor when the spot price at the time of contract execution dropped to 1,350 rubles, given that they purchased a three-month put option on 100 shares of X with a strike price of 1,600 rubles and an option premium of 20,000 rubles.
a) a loss of 5,000 rubles
b) a profit of 25,000 rubles
c) a profit of 45,000 rubles
**d) a profit of 5,000 rubles**
Answer: D

16. The net assets of a bond mutual fund amounted to 35,000,000 rubles on July 1, 2022, and there were 8000 fund shares in circulation. How much will an investor receive by redeeming 15 fund shares on that day if the discount for redemption is 1.0%?
a) 64975.247
b) 66287.879
c) 66281.25
**d) 64968.75**
Answer: D

## Section 5. Econometrics

17. Which of the listed models is likely to have an $R^2$ close to 0?
a) Store profit^ = a + b*number of employees

b) Store profit^ = a + b*store area
c) Store profit^ = a + b*number of orders
**d) Store profit^ = a + b*length of the company's name**
Answer: D

18. If the coefficient $\beta$ in the model $y^{\wedge}=\alpha+\beta*x$ is equal to -0.54, how should x be changed to increase y by 2?
a) Increase by approximately 2
b) Increase by approximately 4
c) Decrease by approximately 2
**d) Decrease by approximately 4**
Answer: D

19. Using data from seven observations, the following model was obtained: $y^{\wedge}=2+3*x$. The standard error of the coefficient for x is 1. The tabular value of the t-statistic for a significance level of 1% is 4.03; for a significance level of 5%, 2.57; for 10%, 2.02. The coefficient for the variable:
a) Is significant at the 1% significance level
**b) Is significant at the 5% significance level (and not more)**
c) Is significant at the 10% significance level (and not more)
d) Is not significant
Answer: B

20.What is the value of the coefficient $\beta$ in the model $y^{\wedge}=\alpha+\beta*x$, whose coefficients were found using the least squares method, if, based on the sample data, the estimate of cov(x,y) is 2, and the sample variance of x is 0.5?
**a) 4**
b) 0.25
c) 1
d) 2.5
 Answer: A

## 1.2.  Intermediate tasks
### Section 1. Economic behavior of consumers and producers
1.  A firm has a total cost function given by TC = 100 + 20Q + Q^2, where Q is the quantity of output produced. The market price for the firm's output is $30 per unit. Find the quantity of output the firm should produce to maximize its profit. Give the answer as an integer without specifying units of measurement.
Answer: **5**

2. A consumer has an income of $100 and spends it all on two goods: X and Y. The price of X is $5 per unit, and the price of Y is $2 per unit. The consumer's utility function is U(X,Y) = X^0.5Y^0.5. How many more units of good Y than good X should the consumer buy to maximize the utility of these goods? Give your answer as an integer without specifying units of measurement.
Answer: **15**

### Section 2. Macroeconomics
3. If household income increases from 40 monetary units to 60 monetary units, and consumption increases by 15 monetary units, what will be the multiplier of autonomous expenses?
Give your answer as an integer without specifying units of measurement.

Answer: **4**

4. Which of the following are anti-inflationary government actions? There are two correct answers.
**a) The Central Bank increasing the discount rate**
**b) Selling government securities**
c) Compensatory payments to the population
d) Decreasing the reserve requirement ratio
Answer: A,B

## Section 3. Macroeconomic dynamics. Open economy models

5. Which actions lead to an increase in the surplus of the current account of China's balance of payments? There are three correct answers.
**a) Iranian households buying BMW cars assembled in China**
**b) A Russian airline purchasing a batch of inflight meals from Chinese companies**
c) Russian companies attracting Chinese investments in the production of consumer goods in Russia
**d) Russian tourists purchasing China tour packages**
Answer: A,B,D

6. Which does the current account of the national balance of payments include? There are three correct answers.
**a) commodity export/import**
**b) net current transfers**
**c) net factor foreign income**
d) commercial loans and borrowings
Answer: A,B,C

## Section 4. Financial markets and financial instruments

7.

Determine how much the increased amount for placing the funds in a ruble deposit will be higher compared to the increased amount for placing the funds in a foreign currency deposit. The answer is calculated in rubles. Give your answer as an integer without specifying units of measurement.

An investor deposits 150,000 rubles in a bank account for two years at an 8% annual rate (compound interest). Simultaneously, the same amount is deposited in a foreign currency account for two years at a 4% annual rate (compound interest). The exchange rate at the time of currency conversion is 80 rubles per euro, and the projected exchange rate at the end of the operation is 86 rubles per euro. Calculate the difference between the amount of accretion on the ruble deposits and that on the deposit in a foreign currency. Give your answer in rubles as an integer without specifying units of measurement.

Answer: **552**

8. Calculate the present value of company X shares given an expected annual growth rate of 5% in dividend payments, last year's dividend of 11 rubles per share, and a desired yield of at least 15% per annum. Provide the answer as a number rounded to one decimal place using a dot as a separator, without specifying units of measurement.

Answer: **115.5**

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## Section 5. Econometrics

9. Calculate the regression coefficient for the model $Y^{\wedge}=\alpha+\beta*X$ constructed from the sample beow, using the least squares method.

| Y | X |
|---|---|
| 1 | 2 |
| 4 | 4 |
| 2 | 3 |
| 5 | 4 |

Give your answer as a number rounded to two decimal places using a dot as a separator, without specifying units of measurement.

Answer: **1.82**

10. Find the coefficient of determination for the model $y^{\wedge}=\alpha+\beta*x$, if it cov(x,y)=1.666; the sample variance of x is 3.333; the sample variance of y is 0.917.

Give your answer as a number rounded to two decimal places using a dot as a separator, without specifying units of measurement.

Answer: **0.91**

# Part 2. Advanced tasks

**Each Olympiad version includes three long-form questions from any three thematic units. The sample test offers one advanced task for each thematic unit.**

**Section 1. Economic behavior of consumers and producers**

1. The market for video games has a downward sloping demand curve, given by the equation QD = 126 – 7P, and an upward sloping supply curve, given by the equation QS = 14P.
1) (2 points) Compute consumer and producer surpluses.
2) (4 points) The government has introduced a tax of \$3 on suppliers for every video game sold. What will be the new equilibrium quantity of games sold?
3) (4 points) What are the quantities of producer and consumer surpluses after the introduction of the tax?

SOLUTION:
1) Equating supply and demand gives:
126 – 7P = 14P, so P = 6 and Q = 84.
The equilibrium quantity is 84, and the price in the market is 6. The consumer surplus is **504,** and the producer surplus is **252.**
2) The new equilibrium is:
126 – 7P = 14(P – 3) => Pd = 8; Ps = 5 and Q = **70**.
3) The government gets tax revenue is 70*3 = 210; the new consumer surplus is (70*(18 – 8))/2=**350** and the producer surplus is (5*70)/2 = **175.**

ANSWERS:
1)    The consumer surplus is **504**, and the producer surplus is **252** (worth 2 points).
2)    The new equilibrium quantity is **70** (worth 4 points).
3)    The consumer surplus is **350**, and the producer surplus is **175** (worth 4 points).

## Section 2. Macroeconomics

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2. The consumption function without taxes is given by $C = 52 + 0.8Y$; the consumption function with taxes is given by $C = 44 + 0.64Y$. Autonomous consumption accounts for 50% of autonomous expenditures. Calculate the following:

1) (2 points) the simple multiplier of autonomous expenditures; draw a conclusion;

2) (4 points) the complex multiplier of autonomous expenditures (round the answer to 1 decimal place); draw a conclusion;

3) (4 points) the volume of tax revenues in equilibrium conditions.

SOLUTION:

**1)** The simple multiplier of autonomous expenditures is given by

MultAE = 1 / (1-MPC), where MPC is the marginal propensity to consume.

From the consumption function without taxes, we obtain

$C = 52 + 0.8Y$.

Thus, MPC = 0.8.

Therefore,

MultAE = 1 / (1 - 0.8) = **5**.

*Conclusion: This means that a 1 unit increase in autonomous expenditures will lead to a 5 unit increase in equilibrium income.*

**2)** The complex multiplier of autonomous expenditures is given by

MultAE = 1 / (MPS+MPC*t),

where MPS is the marginal propensity to save; *t* is the marginal tax rate.

From the consumption function without taxes, we obtain

$C = 52 + 0.8Y$.

Thus, Ca = 52,

MPC = 0.8,

MPS = 1 – MPC = 0.2.

From the consumption function with taxes, we have

$C = 44 + 0.64Y$.

Thus, (1 -t)*MPC = 0.64, where *t* is the marginal tax rate.

Solving for t, we obtain t=0.2.

Therefore,

MultAE = 1 / (MPS + MPC*t) = 1 / (0.2 + 0.8*0.2) = **2.8**.

*Conclusion: This means that a 1 unit increase in autonomous expenditures will lead to a 2.8 unit increase in equilibrium income. The complex multiplier is smaller than the simple multiplier, indicating that the introduction of taxes weakens the multiplier effect.*

3) The tax function is given by

T=Ta + t*Y,

where Ta is autonomous taxes, and *t* is the marginal tax rate.

From the consumption function with taxes, we have

$C = 44 + 0.64Y$.

From the consumption function without taxes, we obtain $C = 52 + 0.8Y$.

Thus, Ca – MPC*Ta = 44

      52 - 0.8*Ta = 44,

which means that Ta = 10.

Therefore, the tax function is

T = 10 + 0.2Y.

Let Y* be the equilibrium income.

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The equilibrium income is given by the product of the multiplier and autonomous expenditures (using the complex multiplier with the marginal tax rate $t$).

Y* = MultAE * AEa

Since autonomous consumption accounts for 50% of autonomous expenditures, we have

AEa = 2*Ca = 2*52 = 104.

Therefore,

Y* = 2.8*104 = 291.2.

Tax revenues at the equilibrium income level Y*= 291.2 are

T = 10+0.2*291.2 = **68.24** (worth 4 points).

ANSWERS:

1) The **simple** multiplier of autonomous expenses **MultAE = 5** (worth 2 points).

Conclusion: the increase in equilibrium income is 5 times that in autonomous expenses causing it.

2) The **complex** multiplier of autonomous expenses **MultAE = 2.8** (worth 4 points).

Conclusion: the increase in equilibrium income is 2.8 times that in autonomous expenses causing it. The complex multiplier is smaller than the simple one; thus, the introduction of taxes weakens the multiplication effect.

3) The volume of tax revenues in equilibrium conditions **T = 68.24** (worth 4 points).

### Section 3. Macroeconomic dynamics. Open economy models

3. (10 points) The table shows the demand and supply functions for the identical good in two countries (D stands for demand; S, supply; P, price of the good).

| Country 1 | | Country 2 | |
|---|---|---|---|
| demand ($D_1$) | supply ($S_1$) | demand ($D_2$) | supply ($S_2$) |
| $D_1 = 100 - P$ | $S_1 = -10 + 2P$ | $D_2 = 115 - P$ | $S_2 = -15 + P$ |

Assuming international trade in the good between the countries with negligible transport costs, calculate:

1) the world price of the good (worth 2 points);

2) the direction of the flow of the good (which country is exporting and which country is importing the good) and the volume of exports/imports for each country (worth 4 points);

3) the change in the world production volume of the good in an open economy, compared to a closed system without international trade in the good (worth 4 points).

SOLUTION:

1) Let us find the world demand function for the good:

Dw = D1 + D2 = 100 – P + 115 – P = 215 – 2P

Then let us find the world supply function for the good:

Sw = S1 + S2 = –10 + 2P – 15 + P = –25 + 3P

Equating demand to supply:

Dw = Sw

Then:

215 – 2P = –25 + 3P

Therefore, Pw = P = **48** currency units.

2) With the world price Pw = 48, the volumes of demand and supply for each country will be determined as follows:

| Country 1 | | Country 2 | |
|---|---|---|---|
| Demand (D1) | Supply (S1) | Demand (D2) | Supply (S2) |

| $D_1 = 100 - P =$ $= 100 - 48 = 52$ | $S_1 = -10 + 2P =$ $= -10 + 2*48 = 86$ | $D_2 = 115 - P =$ $= 115 - 48 = 67$ | $S_2 = -15 + P =$ $= -15 + 48 = 33$ |
|---|---|---|---|
| The excess of supply over demand will be 86 – 52 = 34. This excess can be **exported** by the country in the amount of **34** units. | | The excess of demand over supply will be 67 – 33 = 34. The insufficient volume of national production can be compensated for by **imports** in the amount of **34** units. | |

3) The world production volume of the good in an open economy at the equilibrium world price Pw = 48 will be:

Sw = –25 + 3Pw = –25 + 348 = **119** each.

In a closed economy, we find the volume of national production for each country based on the condition of equality of demand and supply in the market.

*Country 1:*

D1 = S1

100 – P = –10 + 2P

Equilibrium price P1 = 36.7 currency units.

Equilibrium supply volume S1 = –10 + 2P = –10 + 2*36.7 = **63 units**.

*Country 2:*

D2 = S2

115 – P = –15 + P

Equilibrium price P2 = 65 currency units.

Equilibrium supply volume S2 = –15 + P = –15 + 65 = **50** units.

The total production volume in the two countries in the absence of trade is:

S1 + S2 = 63 + 50 = **113 units**.

This is fewer than in the conditions of international trade:

119 – 113 = **6 units**.

ANSWER:

1) the world price of the good is Pw = **48 currency units** (worth 2 points).

2) country 1 exports and country 2 imports **34 units** of the good (worth 4 points)

3) in an open economy, there is an increase of 6 units in the world production compared to a closed system with no international trade in the same product (worth 4 points).

## Section 4. Financial markets and financial instruments:

4. An investor who owns three types of stocks has evaluated the following joint probability distribution of returns:

| No. | General economic situation | Probability | Stock A return | Stock B return | Stock C return |
|---|---|---|---|---|---|
| 1 | Pessimistic scenario | 0.3 | -10 | 10 | -8 |
| 2 | No change | 0.1 | 8 | 15 | 12 |
| 3 | Realistic scenario | 0.4 | 15 | 25 | 15 |
| 4 | Optimistic scenario | 0.2 | 20 | 15 | 10 |

The investor invests 45% of their funds in stock A, 20% in stock B, and 35% in stock C. It is assumed that the return on each security is uncorrelated with the return on the other securities. Calculate:

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1) the average return on stocks A, B, C (give your answer rounded to three decimal places, using a dot as a separator; worth 2 points);
2) the variance of stocks A, B, C (give your answer rounded to three decimal places, using a dot as a separator; worth 4 points);
3) he expected return and standard deviation of the portfolio (give your answer rounded to 2 decimal places, using a dot as a separator; worth 4 points).

SOLUTION:
**1)** Let us calculate the average return on stocks, using the formula:

$$\overline{X} = \sum_{i=1}^{n}(X_i \cdot p_i)$$

where:
Xi is the return on the stock in the i-th situation;
pi is the probability of obtaining the return Xi in the i-th situation.
We obtain:
For stock A: $\overline{X}$ = (-10)*0.3+8*0.1+15*0.4+20*0.2 = **7.800%**
For stock B: $\overline{X}$ = 10*0.3+15*0.1+25*0.4+15*0.2 = **17.500%**
For stock C: $\overline{X}$ = (-8)*0.3+12*0.1+15*0.4+10*0.2 = **6.800%**

2. Let us determine the variance for each stock, using the formula:

$$\sigma^2 = \sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2 \cdot p_i$$

where:
$\sigma^2$ is stock variance;
Xi is the return on the stock in the i-th situation;
$\overline{X}$ is the expected return on the stock;
pi is the probability of obtaining the return Xi in the i-th situation.
We get:
For stock A:

σ² = (-10-7.8)²*0.3 + (8-7.8)²*0.1 + (15-7.8)²*0.4 + (20-7.8)²*0.2 = **145.560%**

For stock B:

σ² = (10-17.5)²*0.3+ (15-17.5)²*0.1 + (25-17.5)²*04 + (15-17.5)²*0.2 = **24.375%**

For stock C:

σ² = (-8-6.8)*0.3 + (12-6.8)*0.1 + (15-6.8)*0.4 + (10-6.8)*0.2 = **31.648%**

3) The expected return of the portfolio as a whole is assumed to be the weighted average of the returns of the securities in the portfolio.
Let us calculate the expected return of the portfolio using the formula:

$$X_p = \sum_{i=1}^{n}(X_i \cdot W_i)$$

where Xp is expected return of the portfolio;
Xi is expected return of the i-th security;
Wi is the proportion of total investment expenses on the purchase of the i-th security (the "weight" of the i-th security in the portfolio);

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n is the number of securities in the portfolio.
According to the initial conditions, $W_A = 0.45$, $W_B = 0.2$, $W_C = 0.35$.
We get:

$$X_p = 7.8 * 0.45 + 17.5 * 0.2 + 6.8 * 0.35 = 9.39\%$$

Let us calculate the standard deviation of the portfolio, using the formula:

$$\sigma_p = \sqrt{\sum_{i=1}^{n} \sigma_i^2 \cdot W_i^2 + 2 \cdot \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} X_i \cdot X_j \cdot r_{ij} \cdot W_i \cdot W_j}$$

where
$\sigma^2$ is the variance (variation) of the portfolio;
$r_{ij}$ is the correlation coefficient between the returns of the i-th and j-th securities;
In this case, we assume that the returns on each security are uncorrelated with each other, so the second term in the formula is equal to zero.
Thus, we get:

$$\sigma_p = \sqrt{145.56 \cdot 0.45^2 + 24.375 \cdot 0.2^2 + 31.648 \cdot 0.35^2} = 5.86\%$$

Therefore, the expected return and standard deviation of the portfolio are **9.39%** and **5.86%,** respectively.

ANSWER:
1)      Average return for stock A: $\overline{X}$ = **7.800%**
        Average yield for a stock B: $\overline{X}$ = **17.500%**
        Average yield for a stock C: $\overline{X}$ = **6.800% (worth 2 points)**
2)      The variance for the stock A $\sigma^2$ = **145.560%**
        The variance for the stock B $\sigma^2$ = **24.375%**
        The variance for a stock C $\sigma^2$ = **31.648% ((worth 4 points)**
3)      The expected return of the portfolio will be **9.39%,** and its standard deviation is **5.86% (worth 4 points).**

### Section 5. Econometrics:

5. Below are the results of evaluating an equation modelling the relationship between hourly wage (W, dollars/hour) and the following parameters: employment sector (SECTOR, dummy variable, 1-industry, 0-agriculture), age (AGE, years), level of education (EDU, dummy variable, 1-higher education, 0-other). (The task is worth 10 points.)

| SOURCE | SS | DF | MS | NUMBER OF OBS | 150 |
|---|---|---|---|---|---|
| | | | | F(3, 146) | 48.37 |
| MODEL | 7851.83624 | 3 | 2617.27875 | PROB > F | 0.0000 |
| RESIDUAL | 7900.4612 | 146 | 54.1127479 | R-SQUARED | 0.4985 |
| | | | | ADJ R-SQUARED | 0.4882 |
| TOTAL | 15752.2974 | 149 | 105.720117 | ROOT MSE | 7.3561 |

| W | COEFFICIENT | STD. ERR. | T | P>T | [95% CONF. | INTERVAL] |
|---|---|---|---|---|---|---|
| SECTOR | 2.725924 | 1.496055 | ? | 0.070 | -.2307982 | 5.682647 |
| EDU | ? | 0.5520092 | 5.55 | 0.000 | 1.97434 | 4.156262 |

| AGE | 0.4666523 | ? | 8.16 | 0.000 | .3536088 | .5796959 |
|---|---|---|---|---|---|---|
| CONS | -2.74865 | 2.178253 | -1.26 | 0.209 | -7.053631 | 1.55633 |

1) What hypothesis does the Fisher test prove? Interpret the significance of the regression at α = 0.05 (worth 2 points).

2) Calculate the missing indicators (coefficients, standard error, t-statistic), provide formulas for the calculations, and round the answer to three decimal places. Draw conclusions about the significance of the regression coefficients and the constant at α = 0.01, 0.05, and 0.1 (worth 4 points).

3) How does having a university degree affect hourly wage? How does an employee's age influence their hourly wage? What will be the hourly wage of a 35-year-old employee with a university degree (EDU=1), working in the industrial sector (SECTOR=1)?

SOLUTION:

**1)** The Fisher test proves the hypothesis of the insignificance of the equation as a whole (worth 1 point). The regression as a whole is significant since Prob > F is less than α=0.05; therefore, the null hypothesis is rejected (worth 1 point).

**2)** According to the formula for calculating the observed value of the t-statistic, the missing indicators are calculated using the formula $t = \frac{Coef}{Std.Error}$.

- $t_{SECTOR} = \frac{coef_{SECTOR}}{SE_{SECTOR}} = \frac{2.725924}{1.496055} = 1.822$ (worth 1 point)

- $coef_{EDU} = SE_{EDU} * t_{EDU} = 0.5520092 * 5.55 = 3.064$ (worth 1 point)
- $SE_{AGE} = \frac{Coef_{AGE}}{t_{AGE}} = \frac{0.4666523}{8.16} = 0.057$ (worth 1 point)

The coefficients for the variables SECTOR, EDU, and AGE are significant at the 5% level of significance. The hypothesis of the significance of the constant is rejected at the 5% level, the indicator is not significant. (1 point)

**3)** The coefficient for the education variable is 3.064. This means that a person with a university degree will earn $3.064 more per hour than an employee without one (worth 1 point).

The coefficient for the age variable is 0.467, which means that the hourly wage of an employee will increase by $0.467 per hour for each year of experience (1 point).

The evaluation results show that all the indicators, except for the constant, are significant. Therefore, the hourly wage of a 35-year-old employee with a university degree (EDU=1), working in the industrial sector (SECTOR=1) can be calculated using the formula:

$W = -2.74865 + 2.725924 * 1 + 3.064 * 1 + 0.467 * 35 = 19.38$ dollars per hour (worth 2 points). But can we ignore the constant and re-evaluate the equation without it? Excluding the constant from the equation does not allow us to interpret the coefficient of determination $R^2$, because it disrupts the balance of the sum of squared deviations.

ANSWER:

1) The Fisher test proves the hypothesis of the insignificance of the equation as a whole. The regression as a whole is significant (worth 2 points).

2) $t_{SECTOR} = 1.822$, $coef_{EDU} = 3.064$, $SE_{AGE} = 0.057$. The coefficients for the variables SECTOR, EDU, and AGE are significant at 1%, 1%, and 5% levels of significance, respectively. The constant is not significant at the 5% level (worth 4 points).

3) A university degree increases hourly wage by $3.064 per hour; age increases hourly wage by $0.467 per hour for each year of experience. Therefore, an employee is expected to earn $22.13 per hour at the age of 35 (worth 4 points).