ДОМАШНА РАБОТА №1

1) Пресметнете частните производни $z'_x, z'_y, z''_{xx}, z''_{xy}, z''_{yx}$ и z''_{yy} на функцията:

    1.1. $z(x, y) = 4x^3 + 3x^2 y - 5xy^3 + 3y$;   1.2. $z(x, y) = -2x^5 - x^4 y^2 - 5xy + y^3 - 5$;

    1.3. $z(x, y) = 2x^5 + 2x^3 y^2 - 6xy - 2y^3$;   1.4. $z(x, y) = 4xy^3 + 3x^4 y - 5y^3 + 3x - 1$;

    1.5. $z(x, y) = 2x^6 - 4x^3 y - x^2 y^3 - 3y^4$;   1.6. $z(x, y) = 4x^3 + 3y^5 - 5x^2 y^3 + 3$;

    1.7. $z(x, y) = 4y^5 - x^3 y + 4xy^4 - x^2 + 1$;   1.8. $z(x, y) = 2x^9 - 4y^3 - 6x + 2y^3 + 3$;

    1.9. $z(x, y) = 7x^2 + 3y - 5x^2 y^3 + 3xy$;   1.10. $z(x, y) = 2x^3 y + 3x^2 - 5y^3 + 3xy^2$.

2) Пресметнете частните производни z'_x и z'_y на функцията:

    2.1. $z(x, y) = \sin(2x^5 - 2x^3 y)$;   2.2. $z(x, y) = \cos(3xy - 2y^4)$;

    2.3. $z(x, y) = \ln(6x^2 y - 5y)$;   2.4. $z(x, y) = \operatorname{tg}(3x^2 y^3 - 2)$;

    2.5. $z(x, y) = \arcsin\left(\dfrac{x^3}{y^2}\right)$;   2.6. $z(x, y) = \arccos\left(\dfrac{2x^2}{y^5}\right)$;

    2.7. $z(x, y) = \operatorname{arctg}\left(\dfrac{y^3}{x}\right)$;   2.8. $z(x, y) = \operatorname{arccotg}\left(\dfrac{2y}{x^5}\right)$;

    2.9. $z(x, y) = \sin\left(\dfrac{\sqrt{x}}{y^2}\right)$;   2.10. $z(x, y) = \operatorname{cotg}\left(\dfrac{2y}{\sqrt{x}}\right)$.

3) Пресметнете частните производни z'_x и z'_y на функцията:

    3.1. $z(x, y) = (2x^3 y - 7y + 5)^3$;   3.2. $z(x, y) = (3x^2 y^3 - 3x^2 - 4y)^5$;

    3.3. $z(x, y) = \sqrt{4x^2 y^5 - 3x + 5y^2}$;   3.4. $z(x, y) = \sqrt{-x^2 + 3y^5 - 3xy^2}$;

    3.5. $z(x, y) = \sqrt[3]{2x^3 y^2 - 3xy^5 - 1}$;   3.6. $z(x, y) = \sqrt[3]{2x^5 - 5y^3 + 21}$;

    3.7. $z(x, y) = \dfrac{1}{(3x^2 y - 4y^3 - 2)^4}$;   3.8. $z(x, y) = \dfrac{1}{(x^5 y - 4x^3 - 7)^5}$;

    3.9. $z(x, y) = \dfrac{1}{\sqrt{2x^4 + y^2 + 3}}$;   3.10. $z(x, y) = \dfrac{1}{\sqrt[3]{2xy^2 + 5}}$.

4) Пресметнете частните производни z'_x и z'_y на функцията:

4.1. $z(x, y) = (3^x + x^3 - 3x).\sin y$;

4.2. $z(x, y) = (y^5 - 3y - 2).\cos x$;

4.3. $z(x, y) = (x^5 - 3x^2 - 8).\ln y$;

4.4. $z(x, y) = (y^6 - 5).\arcsin x$;

4.5. $z(x, y) = \sqrt[3]{y}.\operatorname{arctg} x$;

4.6. $z(x, y) = \sqrt{x^3}.\cot g\, y$;

4.7. $z(x, y) = \left(\sqrt{x} + 3\right).e^y$;

4.8. $z(x, y) = \left(\sqrt[4]{y} + 2y\right).\operatorname{tg} x$;

4.9. $z(x, y) = \left(y^3 - \dfrac{1}{y^3}\right).\arccos x$;

4.10. $z(x, y) = \left(x^2 - \dfrac{1}{x}\right).\operatorname{arccotg} y$.

5) Пресметнете частните производни z'_x и z'_y на функцията:

5.1. $z(x, y) = \dfrac{x^2 - 5y}{x^2 y + 4}$;

5.2. $z(x, y) = \dfrac{x^2 - 7y}{x^2 + 3xy}$;

5.3. $z(x, y) = \dfrac{3x^2 - 2y^3}{2xy^2 + 3}$;

5.4. $z(x, y) = \dfrac{x^2 + 3y^3}{3xy + 2}$;

5.5. $z(x, y) = \dfrac{x^2 - 7y - 1}{x^2 + y^2}$;

5.6. $z(x, y) = \dfrac{x^2 + y^3 - 9}{xy + 2}$;

5.7. $z(x, y) = \dfrac{x^2 - 7y}{x^2 + 2xy + 3}$;

5.8. $z(x, y) = \dfrac{x^2 + 4xy}{x^2 - 4y^3 + 6}$;

5.9. $z(x, y) = \dfrac{3x - 5}{y^2 + 5}$;

5.10. $z(x, y) = \dfrac{4y + 3}{x^2 + 6}$.

6) Пресметнете частните производни z'_x и z'_y на функцията:

6.1. $z(x, y) = (x^2 + xy).\sin(x^3 + 5y)$;

6.2. $z(x, y) = (x^2 y + 3).e^{x^3 - 5y + 4}$;

6.3. $z(x, y) = \sqrt{x^2 + 3y}.\cos(x^4 + 5x)$;

6.4. $z(x, y) = \sqrt{y^2 + 4y}.\operatorname{tg}(y^3 + 2xy)$;

6.5. $z(x, y) = \sqrt[4]{x^3}.\operatorname{arccotg}\left(\dfrac{x^2}{y^3}\right)$;

6.6. $z(x, y) = \sqrt[3]{y^2}.\operatorname{arctg}\left(\dfrac{x}{y}\right)$;

6.7. $z(x, y) = (y^4 + 3y - 1).\ln^3(1 + 2xy)$;

6.8. $z(x, y) = (x^3 + 1).\sin^3(2x^5 - 3xy)$;

6.9. $z(x, y) = x.\cos\left(\dfrac{x^4 + y^2}{xy - 1}\right)$;

6.10. $z(x, y) = y.\sin\left(\dfrac{x^4}{y^3} - \dfrac{y}{x}\right)$.