Задача 4

Исследуйте заданную функцию на экстремум.

1. $z = e^{x^2-y}(5-2x+y),\ y>0,\ x>0.$
2. $z = xy^2(1-x-y).$
3. $z = 3x^2 - x^3 + 3y^2 + 4y.$
4. $z = x^3 + 3xy^2 - 15x - 12y.$
5. $z = 2x^3 - xy^2 + 5x^2 + y^2.$
6. $z = (2x^2 + y^2)e^{-(x^2+y^2)}.$
7. $z = x^2 + (y-1)^2.$
8. $z = (x-y+1)^2.$
9. $z = xy\ln(x^2+y^2).$
10. $z = x^2 - (y-2)^2.$
11. $z = (x^2+y^2)e^{-(x^2+y^2)}.$
12. $z = (x^2+y^2)e^{-(x^2+y^2)}.$
13. $z = (x^2+y^2)e^{-(x^2+y^2)}.$
14. $z = 1-\sqrt{x^2+y^2}.$
15. $z = 3y^2 + (2x-1)^2.$
16. $z = e^{x+2y}(x^2 - xy + 2y^2).$
17. $z = x^3 + y^3 - 6xy.$
18. $z = y^2x^3(4-y-x).$
19. $z = y^2 + x^2 - xy + 2x - y.$
20. $z = e^{x-2y}(2x+y).$
21. $z = y^2 + 3x^2 + y - x.$
22. $z = (x^2+y^2)e^{-(x^2+y^2)}.$
23. $z = 2x^2 - x + (y+1)^2.$
24. $z = x^2y(2-x+y).$
25. $z = 2x^4 + y^4 - x^2 - 2y^2.$
26. $z = x^4 + y^4 - x^2 - 2xy - y^2.$
27. $z = x^2 + xy + y^2 - 3x - 6y.$
28. $z = e^{2x+3y}(8x^2 - 6xy + 3y^2).$
29. $z = x^2 + y^2 + (x+y-2)^2.$
30. $z = (5x+7y-25)e^{-(x^2+xy+y^2)}.$

Задача 5

Найдите наибольшее и наименьшее значения функции $z(x, y)$ в заданной области.

1. $z = x^3 + y^3 - 9xy + 27, 0 \le x \le 4, 0 \le y \le 4.$
2. $z = x - 2y - 3, 0 \le x \le 1, \ 0 \le y \le 1, \ 0 \le x + y \le 1.$
3. $z = x^2 + y^2 - 12x + 16y, x^2 + y^2 \le 25.$
4. $z = x^2 + y^2 + xy, |x| + |y| \le 1.$
5. $z = 4x^2 + y^2 - 2y, -1 \le x \le 1, 0 \le y - x \le 1, 0 \le x + y \le 1.$
6. $z = x + 2y, 0 \le x \le 2, \ 0 \le y \le 2, \ 0 \le x + y \le 2.$
7. $z = 3x + 4y - 2, -1 \le x \le 1, \ 0 \le y - x \le 1, \ 0 \le x + y \le 1.$
8. $z = 2x^2 - y^2, x^2 + y^2 \le 16.$
9. $z = y^2 - x^2, x^2 + y^2 \le 9.$
10. $z = x^2 + y^2 - 2xy, |x| + |y| \le 1.$
11. $z = y - x, -1 \le x \le 0, \ 0 \le y \le 1.$
12. $z = x^2 - y^2, |x| + |y| \le 2.$
13. $z = x^2 + y^2 + 2xy, 0 \le x \le 3, \ 0 \le y \le 3, \ 0 \le x + y \le 3.$
14. $z = 2y + x, y \ge x^2, \ y - 2x \le 3.$
15. $z = y^2 - 2x^2, x^2 + y^2 \ge 1, \ x^2 + y^2 \le 100.$
16. $z = x^2 + y^2 - xy + 1, y \ge x^2 - 1, \ y \le 4.$
17. $z = 1 - x - y, x^2 + y^2 \le 4.$
18. $z = x - x^2 + y^2, x^2 + y^2 \le 9.$
19. $z = 5x - 3y, y \ge x, \ y \ge -x, \ y \le 4.$
20. $z = 2x^2 + y^2 - 4x + y, x^2 + 4y^2 \le 4.$
21. $z = \frac{1}{2}x^2 - y^2 + 5x - y, 0 \le x \le 1, \ 0 \le y \le 1.$
22. $z = 4 - 3x + 2y, x^2 + y^2 \le 9.$
23. $z = 2x^2 + 4y^2 - xy, 0 \le x \le 1, \ -1 \le y \le 0.$
24. $z = 10 - x - y, x^2 + y^2 \le 64.$
25. $z + 2 = x^2 - 5y^2, 0 \le x \le 2, \ y - x \le 0.$
26. $z - 4 = 5x + 4y, x^2 + y^2 \le 4.$
27. $z + 1 = x^2 + x + y^2 - 4y, -1 \le x \le 0, \ y - x \le 1.$
28. $z = x^2 + y^2, x^2 + y^2 \le 100.$
29. $z = x^2 + 2y^2 - x, x^2 + y^2 \le 100, \ y \ge 0.$
30. $1 - z = 3y^2 + x^2, 0 \le x \le 1, \ -1 \le y \le 0, \ 0 \le x - y \le 1.$