

Plot of a region in E_2

RegionPlot[{**constr1**, **constr2**}, {x, *, *}, {y, *, *}]

Definition of function $f[x_, y_] = \text{formula}$

Function value in point $X = [*, *]$ $f[*, *]$

Graph of function $f(x, y)$

Plot3D[f[x, y], {x, *, *}, {y, *, *}, **BoxRatios** -> **Automatic**, **AxesLabel** → {"x", "y", "z"}]

Graph bounded from above (below) by plane $z = k$

Plot3D[f[x, y], {x, *, *}, {y, *, *}, **RegionFunction** -> **Function**[{x, y, z}, f[x, y] ≤ k]]

Graph of function on specified region

Plot3D[f[x, y], {x, *, *}, {y, *, *}, **RegionFunction** -> **Function**[{x, y, z}, **specification**]]

Precision of function graph

Plot3D[f[x, y], {x, *, *}, {y, *, *}, **BoxRatios** -> **Automatic**, **PlotPoints** → *]

Graph of function with level lines

ContourPlot[f[x, y], {x, *, *}, {y, *, *}]

Problems

1. Plot domains of definition and graphs of functions:

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|---|---|
| a) $f(x, y) = 1 + \arcsin(x + y)$ | b) $f(x, y) = \frac{1}{x^2 - y^2 + 1} + \ln(e - y - x^2)$ |
| c) $f(x, y) = 2 - \sqrt{4 - x^2 - y^2}$ | d) $f(x, y) = \sqrt{1 - 2x^2 - y^2}$ |
| e) $f(x, y) = \sqrt{2x^2 + y^2 + 1}$ | f) $f(x, y) = \sqrt{2x^2 + y^2 - 4}$ |
| g) $f(x, y) = \sqrt{x^2 - y^2 + 1}$ | h) $f(x, y) = \sqrt{x - y^2}$ |
| i) $f(x, y) = \sqrt{1 - xy}$ | j) $f(x, y) = \cos \sqrt{2x^2 + y^2}$ |

2. Plot graph of function and tangent plane to the graph in the point T :

- | | |
|---|--|
| a) $f(x, y) = x^2 + y^2, T = [1, 1, ?]$ | b) $f(x, y) = \sin(xy), T = [0, 0, ?]$ |
| c) $f(x, y) = \text{Arctg}(xy), T = [1, 2, ?]$ | d) $f(x, y) = \ln(xy), T = [e, e, ?]$ |
| e) $f(x, y) = 1 - \sqrt[3]{x^2 + y^2}, T = [2, 2, ?]$ | f) $f(x, y) = \ln(x^2 + y^2), T = [0, e, ?]$ |

3. Find equation of intersection curve of function $f(x, y)$ graph and plane α and plot it:

- | | |
|---|---|
| a) $f(x, y) = x^2 + y^2, \alpha : z = x + y + 2$ | b) $f(x, y) = x^2 - y^2, \alpha : z = 0$ |
| c) $f(x, y) = 4\sqrt{x^2 - y^2}, \alpha : z = 7$ | d) $f(x, y) = xy, \alpha : x + y + z = 1$ |
| e) $f(x, y) = \text{Arctg} \frac{x}{y}, \alpha : z = 0$ | f) $f(x, y) = \sqrt{x - y^2}, \alpha : z = 1$ |

4. Find total differential of function $f(x, y)$ in the point A :

- | | |
|---|-----------------------------------|
| a) $f(x, y) = \text{Arctg}(xy), A = [1, 2]$ | b) $f(x, y) = e^{xy}, A = [1, 1]$ |
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