

Gradients ¹

1. Enter the following commands:

```
[X, Y] = meshgrid(-2:.2:2);  
Z = X.*exp(-X.^2 - Y.^2);  
mesh(X, Y, Z)
```

Rotate this plot into various positions until you fully understand the shape.

2. Next enter the following:

```
[DX, DY] = gradient(Z);  
contour(X, Y, Z)  
hold on  
quiver(X, Y, DX, DY)  
hold off
```

3. Repeat the above steps for the functions: $f(x, y) = \exp(-x^2 - y^2)$ and $f(x, y) = x + y$.
4. What is the relationship between contour (level) curves and gradient vectors?
5. Write a brief report, using complete sentences and standard mathematical notation.

The goal of this project is to familiarize the user with the vector field plot capabilities of the program and aid in the understanding of the meaning of the gradient.

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