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Matplotlib Plotting Cheat Sheet

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Basic Setup

```
import matplotlib.pyplot as plt
import numpy as np

plt.figure(figsize=(width, height))
```

Line Plots

```
plt.plot(x, y, 'bo-')  # Blue line with circle markers
plt.xlabel('X-axis label')
plt.ylabel('Y-axis label')
plt.title('Plot Title')
plt.legend(['Label'], loc='best')
```

Scatter Plots

```
plt.scatter(x, y, marker='o')
```

Histograms

```
plt.hist(data, bins=10, density=True)
```

Combined Plots

```
plt.plot(x, y1, 'b-', label='Line 1')
plt.scatter(x, y2, color='r', label='Scatter')
plt.legend()
```

Saving Figures

```
plt.savefig('filename.pdf')
```

Error Bars

```
plt.errorbar(x, y, yerr=yerror, fmt='ro', ecolor='black')
```

Setting Plot Limits

```
plt.xlim(xmin, xmax)
plt.ylim(ymin, ymax)
```

Masked Arrays

```
masked_data = np.ma.masked_where(condition, data)
```

Logarithmic Plots

```
plt.semilogx(x, y)  # Log scale on x-axis
plt.semilogy(x, y)  # Log scale on y-axis
plt.loglog(x, y)    # Log scale on both axes
```

Multiple Subplots

```
plt.subplot(rows, cols, plot_number)
```

Contour Plots

```
plt.contour(X, Y, Z, levels)
plt.contourf(X, Y, Z, levels)  # Filled contour plot
```

Image Plots

```
plt.imshow(data, extent=[xmin, xmax, ymin, ymax], cmap='colormap')
```

3D Plots

```
from mpl_toolkits import mplot3d
ax = plt.axes(projection='3d')
ax.plot3D(x, y, z)
ax.scatter3D(x, y, z)
ax.plot_surface(X, Y, Z)
```

Customization

```
plt.rcParams.update({'font.size': 12, 'lines.linewidth': 2})
plt.tight_layout()
```

Remember to always call `plt.show()` to display your plots!