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Commands + Code + Text Run all Connect

```
[ ]
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
np.random.seed(0)
X = 2 * np.random.rand(100, 1)
y = 4 + 3 * X + np.random.randn(100, 1)
print("✅ Data generated successfully!")
mean_x = np.mean(X)
mean_y = np.mean(y)
n = len(X)
m = np.sum((X - mean_x) * (y - mean_y)) / np.sum((X - mean_x) ** 2)
c = mean_y - m * mean_x
print("\n--- Manual Calculation ---")
print(f"Slope (m): {m:.4f}")
print(f"Intercept (c): {c:.4f}")
y_pred = m * X + c
plt.figure(figsize=(8, 6))
plt.scatter(X, y, color='blue', label='Data Points')
plt.plot(X, y_pred, color='red', label='Best Fit Line', linewidth=2)
plt.title("Linear Regression (Least Squares Method)")
plt.xlabel("X")
plt.ylabel("Y")
plt.legend()
plt.grid(True)
plt.show()
model = LinearRegression()
model.fit(X, y)
print("\n--- Verification with Scikit-Learn ---")
print(f"Slope (m): {model.coef_[0][0]:.4f}")
print(f"Intercept (c): {model.intercept_[0]:.4f}")
print("✅ Both values are nearly identical to the manual calculation.")
```

Variables Terminal

Light rain At night

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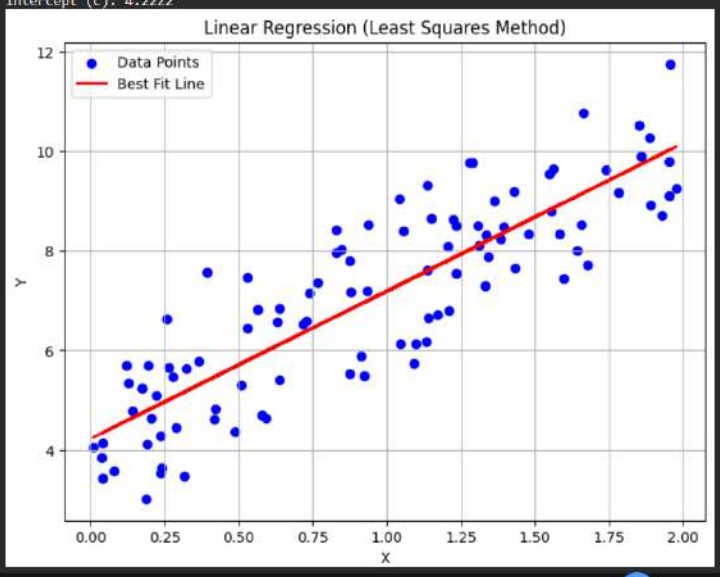
```
Data generated successfully!

--- Manual Calculation ---
Slope (m): 2.9685
Intercept (c): 4.2222
```



Variables Terminal

Light rain At night

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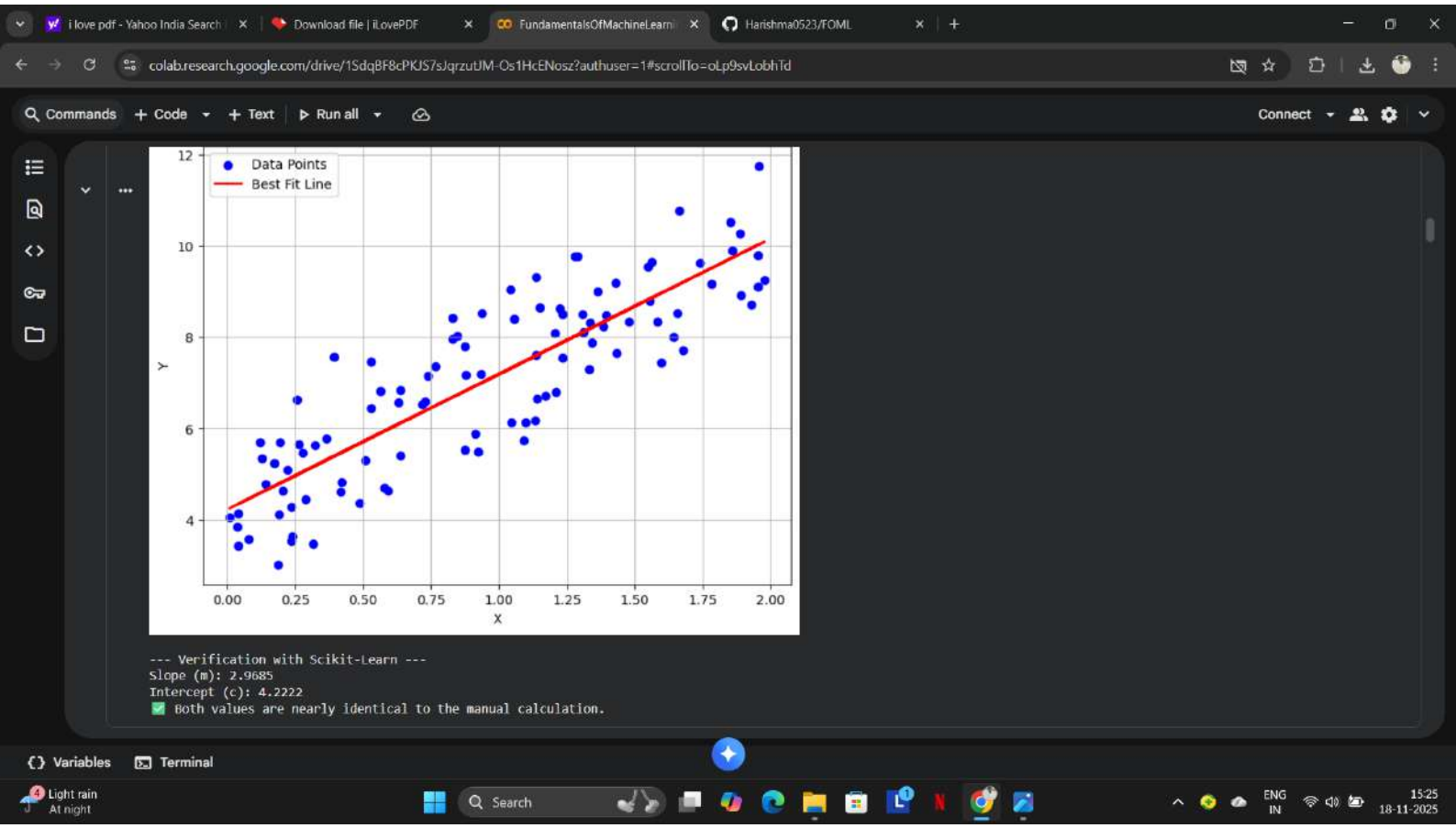


```
--- Verification with Scikit-Learn ---
Slope (m): 2.9685
Intercept (c): 4.2222
✅ Both values are nearly identical to the manual calculation.
```