

Worksheet: Homework Time vs Sleep & Screen Time

Code with Plot:

```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression

# Generate random sleep and screen time data
sleep = np.random.uniform(5, 9, 50) # 50 values between 5 and 9 hours
screen_time = np.random.uniform(1, 5, 50) # 50 values between 1 and 5 hours

# Calculate homework time based on sleep and screen time
homework_time = 0.8 * sleep - 0.5 * screen_time + np.random.normal(0, 0.3, 50)

# Combine sleep and screen time into a 2D array for regression
X1 = np.column_stack((sleep, screen_time))
y1 = homework_time

# Fit a linear regression model
model1 = LinearRegression().fit(X1, y1)

# Plot the data
plt.scatter(sleep, y1, color='blue', label='Sleep')
plt.scatter(screen_time, y1, color='red', label='Screen Time')
plt.xlabel('Hours')
plt.ylabel('Homework Time (hrs)')
plt.title('Homework Time vs Sleep & Screen Time')
plt.legend()
plt.show()
```

Explanation:

This code explores how sleep and screen time affect homework productivity.

We generate synthetic data for sleep and screen time using `np.random.uniform`.

Homework time is calculated using a formula that increases with sleep and decreases with screen time, plus random noise to simulate real-world variability.

`np.column_stack` combines the two features into a format suitable for regression.

We use `LinearRegression().fit()` to train a model that learns the relationship.

Finally, we plot the data to visualize how sleep and screen time relate to homework time.

[Space for answers]

Questions:

1. What effect does sleep have on homework time?
2. What effect does screen time have on homework time?
3. Why do we add random noise to the model?