EXPERIMENT 9:

```
# Dataset
X = [1,2,3,4,5]
y = [2,5,10,17,26]   # quadratic relationship

# -------- Linear Regression --------
w = b = 0
lr = 0.01

for _ in range(1000):
    dw = db = 0
    for i in range(len(X)):
        y_pred = w*X[i] + b
        dw += (y_pred - y[i]) * X[i]
        db += (y_pred - y[i])
    w -= lr * dw
    b -= lr * db

linear_error = sum((w*X[i]+b - y[i])**2 for i in range(len(X)))

# -------- Polynomial Regression (Degree 2) --------
a = b2 = c = 0

for _ in range(1000):
    da = db2 = dc = 0
    for i in range(len(X)):
        y_pred = a*X[i]**2 + b2*X[i] + c
        da += (y_pred - y[i]) * X[i]**2
        db2 += (y_pred - y[i]) * X[i]
```

```
        dc += (y_pred - y[i])
    a -= lr * da
    b2 -= lr * db2
    c -= lr * dc

poly_error = sum((a*X[i]*2 + b2*X[i] + c - y[i])*2 for i in range(len(X)))

print("Linear Regression Error:", linear_error)
print("Polynomial Regression Error:", poly_error)
```

Output

```
ERROR!
Linear Regression Error: 14.000001952907278
Polynomial Regression Error: nan

=== Code Execution Successful ===
```