- **Question 1:**
  - **Part(c):**
    - **Function call:**

      mymeasure(1000,50,100)

      Output:

      numpy.matmul execution time: 0.015629291534423828
      mymult execution time: 4.0142621994018555
      Magnitude of the difference between C1 and C2: 1.697873214916236e-25

    - **Function call:**

      mymeasure(1000,50,100)

      Output:

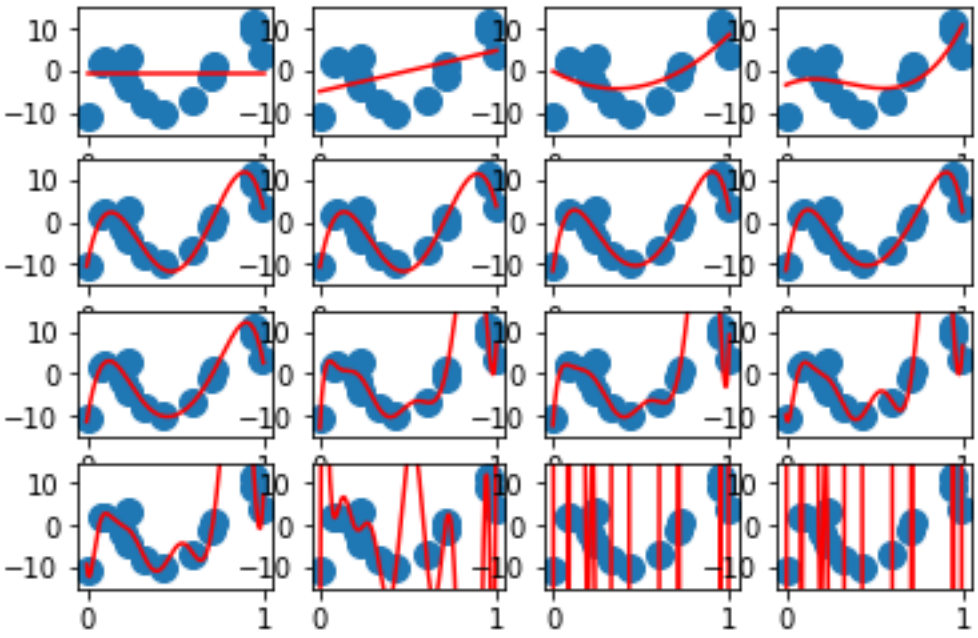
      numpy.matmul execution time: 0.031219005584716797
      mymult execution time: 808.8949754238129
      Magnitude of the difference between C1 and C2: 4.121053151285894e-20

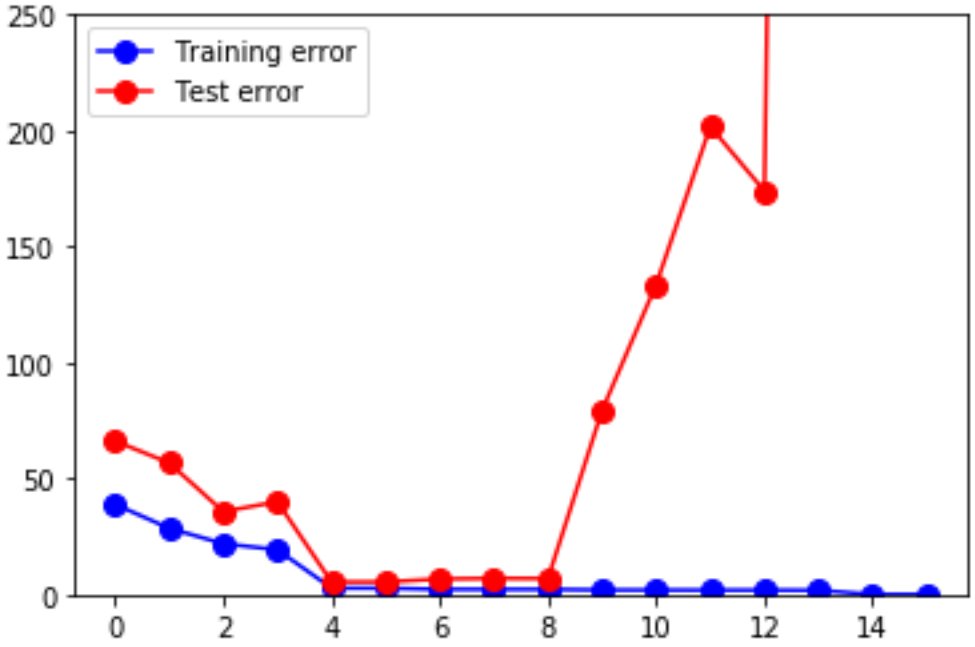
- **Question 3:**
  - **Part (d):**
    - **Function call:**

      bestPoly()
      plt.show()

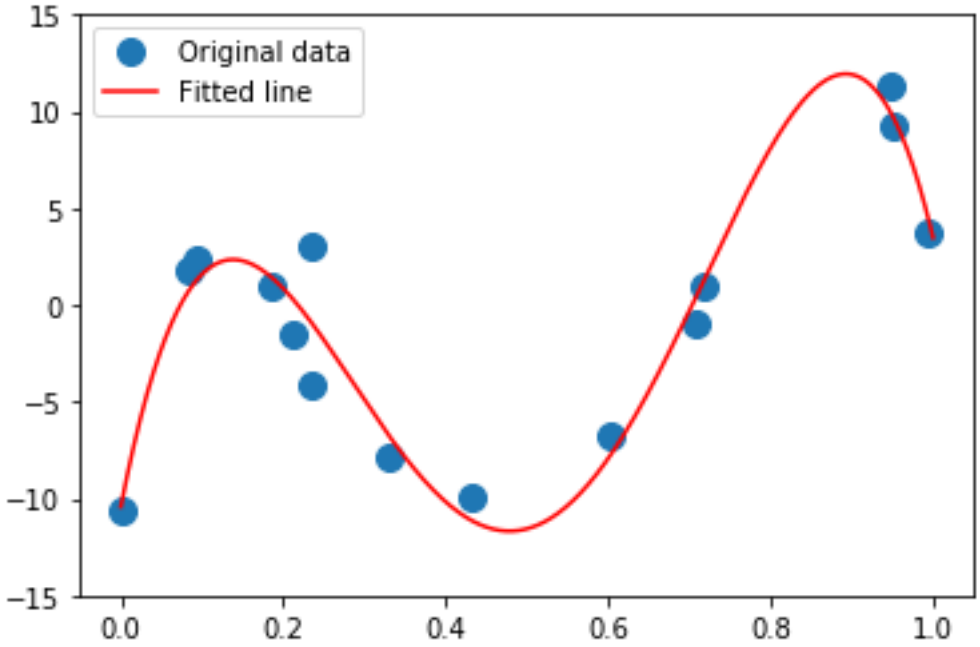
    - **Output:**

      Optimal value of M: 4
      Optimal weight vector, w:
      [-10.4138885 215.08112969 -1124.27527806 1835.00031655 -911.90851798]
      Training error: 2.7377696057651946
      Test Error: 5.3848688201825405





Question 3: Training and Test Error

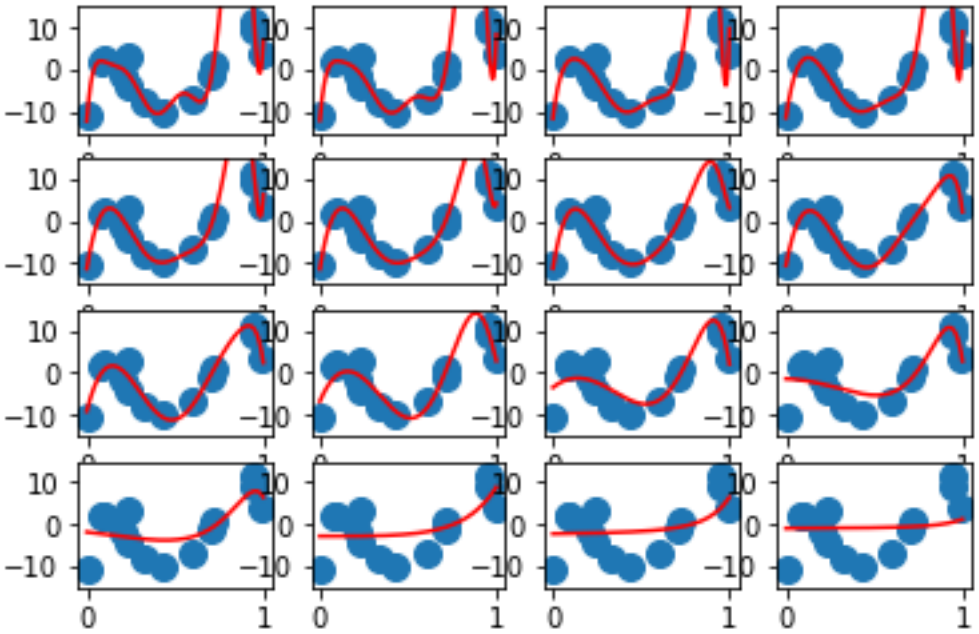


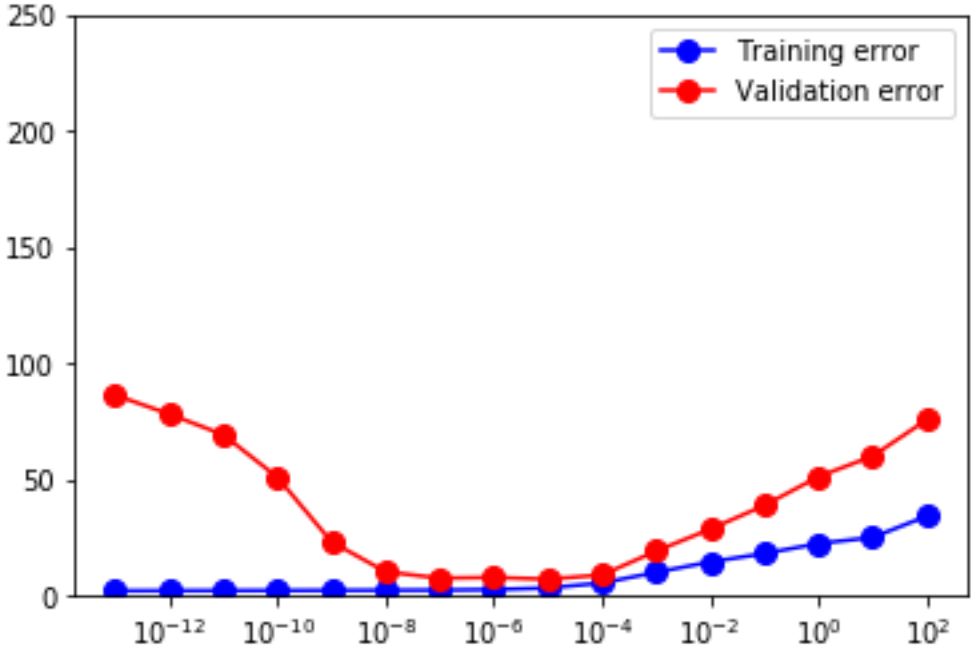
Question 3: Best-fitting polynomial (degree = 4)

- **Question 4:**
  - **Part (b):**
    - **Function call:**

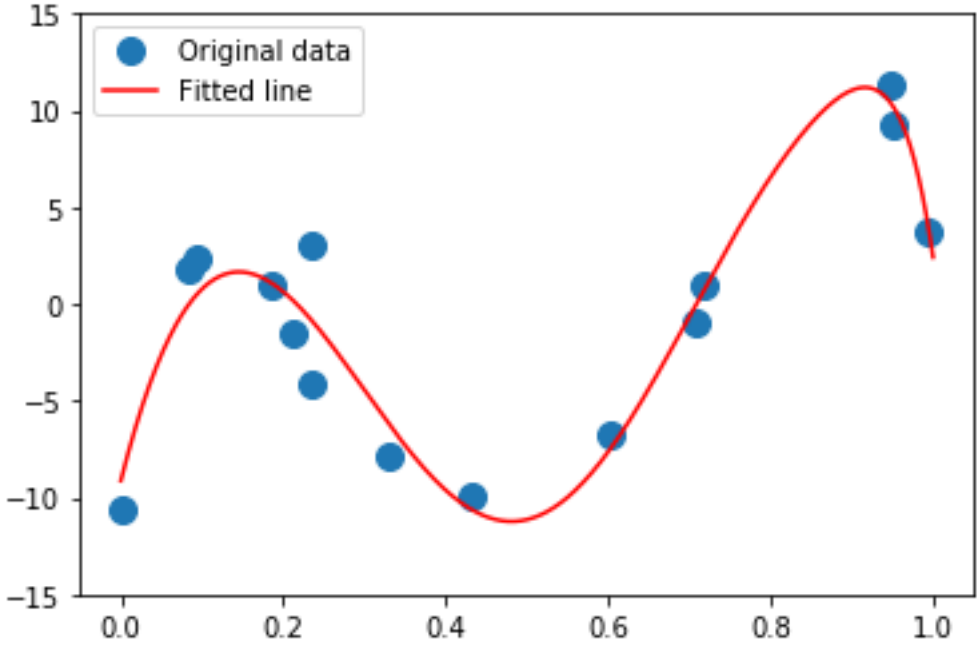
      bestRegPoly()
      plt.show()
    - **Output:**

      Optimal value of alpha: 1e-05
      Optimal weight vector, w:
      [-9.12300038 165.49251116 -740.35613558 730.11816986 312.48258072
      -141.98364005 -278.6555888 -211.72427491 -78.32832282 41.59620664
      114.99534498 135.46323063 108.96736557 45.81490044 -43.30993556
      -149.0295225]
      Training error: 3.0968437341490693
      Validation error: 6.877665854159211
      Test Error: 11.291631502661012



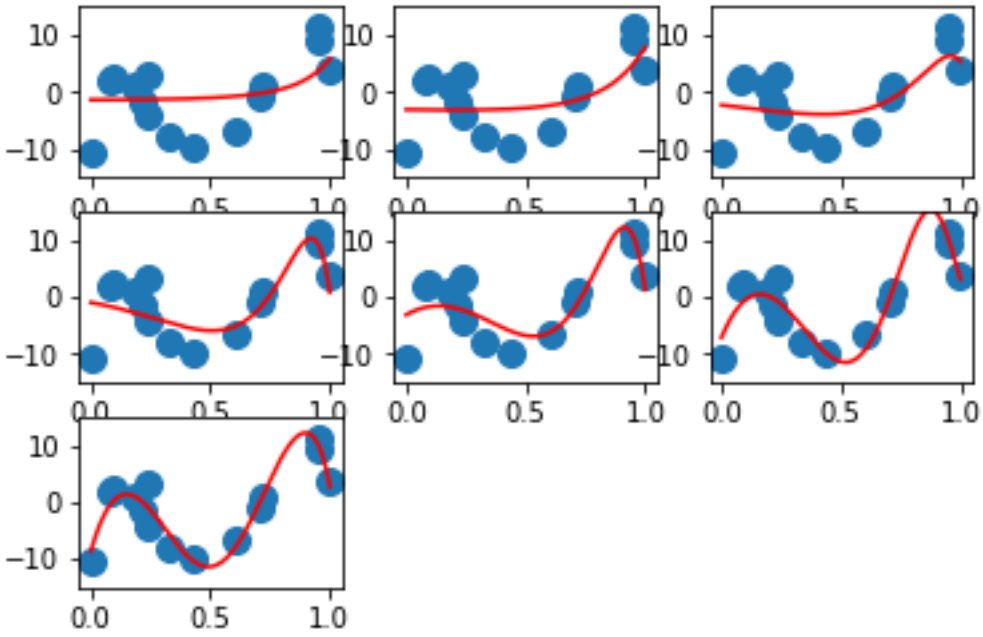


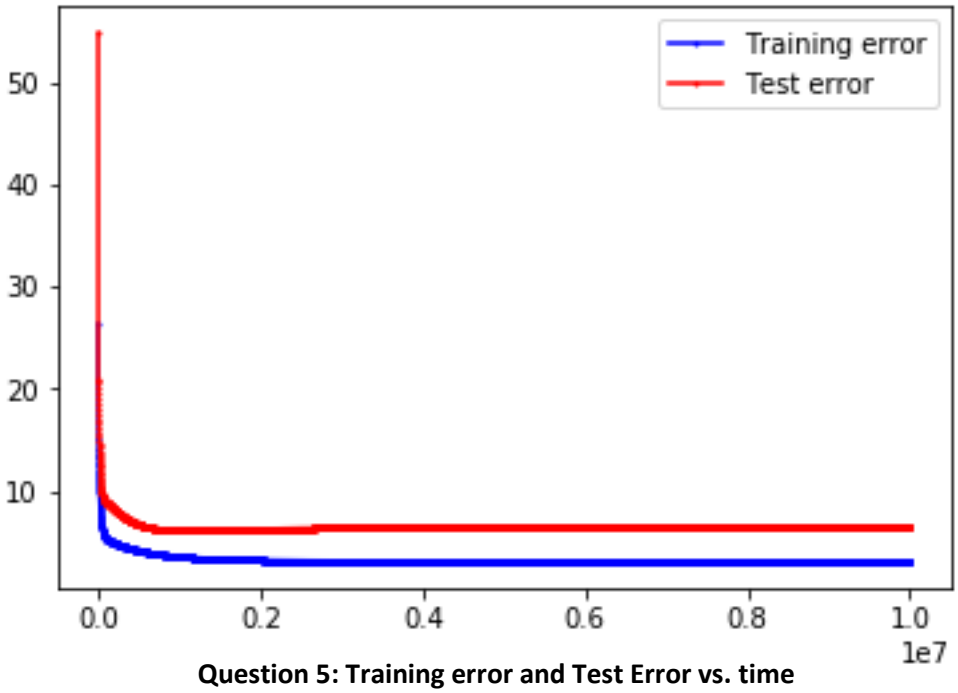
Question 3: Training and Validation Error



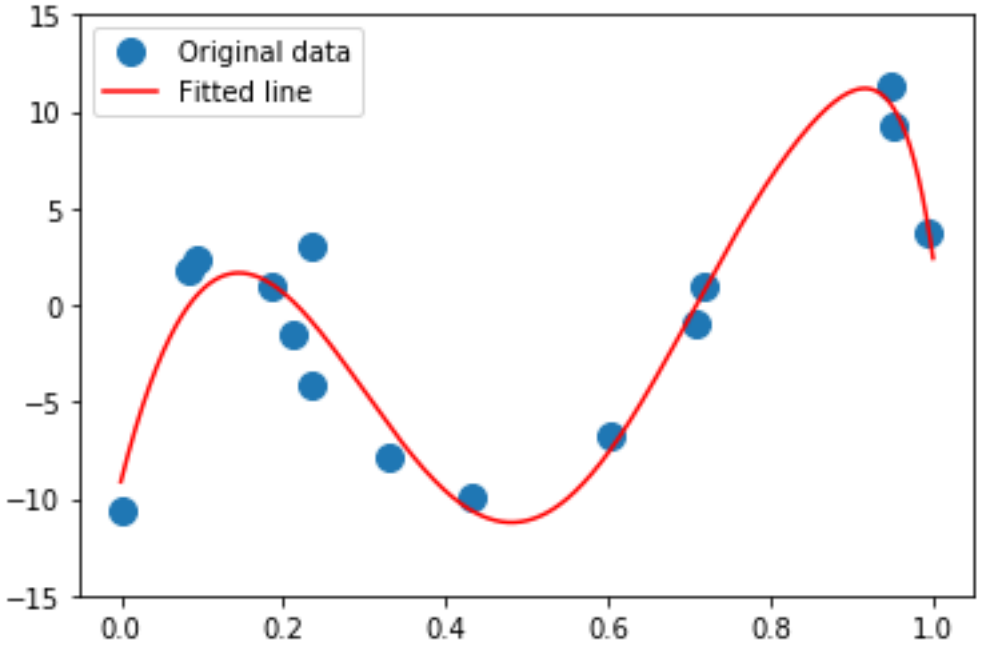
Question 3: Best-fitting polynomial (alpha = 1e-05)

- **Question 5:**
  - **Part (d):**
    - Function call:
      fitPolyGrad(15, 10**(-5), 0.02759)
      plt.show
    - Output:
      Training error: 3.0969621110390713
      Test error: 6.391461283447483
      weight vector: [-9.12286809 165.48404686 -740.27358866 729.8607755 312.68413061
      -141.81291758 -278.69526322 -211.88463023 -78.48053174 41.53477566
      115.03974754 135.58513173 109.11166809 45.91409033 -43.31864347
      -149.20625975]





Question 5: Training error and Test Error vs. time



Question 5: Fitted polynomial