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**3rd year physics Computational Physics**

**Faculty of Education**

**Date: 17/6/2019 Time: 2 hours Mark: 90 marks**

**Answer all the Following Questions**

**Question (1) (24 Marks)**

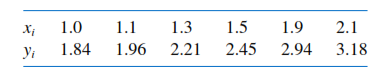
1. **Correct the following Mathematica statements:**
2. expand(1+x^2+x^4)
3. **Write Mathematica statements to define the following:**

3. Which, For*,* While and If statements. Write short notes in their use in Mathematica.

**4.**

**Question (2) (24 Marks)**

1. Explain the theoretical basis of linear least squares method for determining the best linear approximations of a set of data xi and yi.
2. Find the least squares line approximating the data in the following table



1. Write a Mathematica program to find the least squares polynomials of degrees 1, 2, and 3 for the data, xi and yi., in the table. Graph the data and the polynomials.

**باقي الأسئلة خلف الصفحة**

**Question (3) (22 Marks)**

1. Explain the theoretical basis of the bisection method to find the root of an algebraic equation 
2. Show that f (x) = x3 + 4x2 − 10 = 0 has a root in [1, 2], and use the bisection method to

determine an approximation to the root that is accurate to at least within 10−4.

**Question (4) (20 Marks)**

Write Mathematica program to:

1. Express the List A={{1,3,5},{4,-2,0},{8,2.5,5}}in a matrix form.
2. Find the determinant, transpose and inverse of the resulted matrix.
3. Find 
4. Find the eigenvalues and the eigenvectors of *A*.



**انتهت الاسئلة مع تمنياتي بالتوفيق**

**Examiner**

**Prof. Dr. Mustafa Selim**

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