Roll No.: RMM___________________ Name: ___________________________

Part 1

1. The series that exp(-x) equals
   a. $1 + x + x^2/2! + \dots$
   b. $1 - x + x^2/2! - \dots$
   c. $x - x^3/3! + x^5/5! - \dots$
   d. $1 - x^2/2! + x^4/4! - \dots$

2. If two rows in a 3x3 matrix are interchanged, the determinant
   a. remains the same
   b. changes sign
   c. becomes zero
   d. becomes unity

3. The solution of the differential equation 9 y (dy/dx) + 4x = 0 is (where c is a constant)
   a. $(x^2/9) + (y^2/4) = c$
   b. y = c exp(4x/9)
   c. y = cos(x)
   d. y = sin(x)

4. Let **x** be the vector cross product. Which of the following properties is NOT TRUE?
   a. a **x** (b+c) = a **x** b + a **x** c
   b. (a+b) **x** c = a **x** c + b **x** c
   c. a **x** b = -(b **x** a)
   d. (a **x** b) **x** c = a **x** (b **x** c)

5. Let u be the displacement of a vibrating elastic string, say, a violin string; let t be the time and x be the position; c is a constant. One can show that such a string is governed by the following partial differential equation:

   $$\frac{\partial u}{\partial t} = c\frac{\partial^2 u}{\partial x^2}$$

   a.

   $$\frac{\partial u}{\partial x} = c\frac{\partial^2 u}{\partial t^2}$$

   b.

   $$\frac{\partial^2 u}{\partial t^2} = c\frac{\partial^2 u}{\partial x^2}$$

   c.

   $$\frac{\partial u}{\partial t} = c\frac{\partial u}{\partial x}$$

   d.

6. A box contains 10 pens, three of which are defective. Two pens are drawn at random (without replacement – that is, first one pen is drawn and from the remaining 9 pens, another is drawn). What is the probability that both are defective?
    a. 1/15
    b. 1/10
    c. 7/15
    d. 49/100

7. The square of the standard deviation is the
    a. Mean
    b. Outlier
    c. Variance
    d. Median

8. The number of ways in which two (indistinguishable) red balls and two (indistinguishable) blue balls can be arranged at the corners of a square is
    a. 24
    b. 4
    c. 6
    d. 12

9. The eigenvalues of real symmetric matrices are
    a. pure imaginary
    b. pure imaginary or zero
    c. real
    d. complex

10. Fixed point iteration is an iterative method
    a. for solving f(x) = 0
    b. for numerical integration
    c. for numerical differentiation
    d. for extrapolation of data