Physics 200-05
Mini Test

This test does not count for anything. Its purpose is purely to give me a guide as to what your mathematical knowledge is, so that I am neither boring you with things you already understand, or going way over your heads. Note that you are not "expected" to be able to answer these questions at this point. If I find that you do not understant these concepts I will cover them in class when we come to them. However despite this please answer them if you can, as boredom never helped anyone to learn.

There are 6 questions in this test.

1. Given two matrices,

$$A = \begin{pmatrix} 2 & 0 \\ 1 & 1 \end{pmatrix} \tag{1}$$

$$B = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \tag{2}$$

a) What is AB?
b) What is the determinant of B?

2. Given the complex numbers

$$x = 1 + 2i \tag{3}$$
$$y = 3i \tag{4}$$

What is xy

3. A particle of mass 1Kg and velocity 1 m/s travelling in the x direction collides with another particle of mass 2 kg and speed 0 m/s. What is the final velocity of the two particles assuming that the collision is elastic and the velocities after the collision are all purely in the x direction?

4. What is the the taylor series expansion to second order in x of the function

$$f(x) = \sqrt{1 - x} \tag{5}$$

around the point x=0?

5. What is the solution of the differential equation

$$\frac{dy(x)}{dx} = 5y(x) \tag{6}$$

1

assuming that the value of y(0)=1.

6) What is the kinetic energy, the potential energy, and the total energy of a particle of mass m in circular orbit around a star of mass M, at a distance R away from the central star? (the mass m may be assumed to be very much smaller than M.)