Introductory Quiz **PHYS441** **Winter 2020**

PRINT last name first name EMAIL

(it is important to use your official UW email in all correspondence)

NOTE: You are NOT expected to be able to be able to answer all the math and physics questions; just do your best. This quiz will not influence your grade in any way. Please use the space provided for all questions, and WRITE LEGIBLY!

Describe your status: (full time student/full time employed (where?) / ......)

Why are you taking this course and what do you expect from it?

Describe your physics education: (how much, when and where, quantum physics and other physics, too)

Describe your math education

And on music (yes on music; I will explain why I ask):

describe your attitude to music (from love it, to hate it, or in between)

describe your music experience (none, like to listen (to what kind of music?), can sing or play instrument, composing ...

can you name any composition by J.S.Bach?

what is the difference between a fugue and a canon?

what are the notes in the $F^{\#}$ Major chord?

Math:

$\frac{dx^3}{dx} =$ $\int x^3 dx =$

$\frac{d(x\cos x)}{dx} =$ $\int x\cos x\ dx =$

for $f(x,y,z) = x^4 \sin z + z\cos z + z\sin x$ determine:

$\frac{\partial f}{\partial x} =$ $\frac{\partial f}{\partial y} =$ $\frac{\partial f}{\partial z} =$

determine the real and imaginary part of the complex number

$z = (1-i)(-2+3i) =$

what are the real and imaginary parts of $e^{i\phi} =$

what is the determinant of the matrix M:

$det(M) = det \begin{vmatrix} 5 & 2 \\ -1 & 3 \end{vmatrix} =$

what is a result of applying matrix M on a vector $V = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$:

$$MV = \begin{pmatrix} 5 & 2 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} =$$

Quantum physics:

what is the relationship between energy E and frequency f

what is the relationship between momentum p and wavelength λ

can you write the wave function for a free particle with wavelength λ and period T

$\psi(x,t) =$

A wave with wavelength λ passes through a slit of width d. What are the conditions for observing

a) diffraction

b) no diffraction

And last but not least: can you write an equation expressing the Heisenberg Principle of Uncertainty and express it in words?