Name: _____
ID #: _____

Physics 221 - Fall 2019
★ Homework ★
Chapter 1

1) **Two vectors are given by: $\mathbf{A} = 1\hat{\mathbf{x}} + 4\hat{\mathbf{y}} - 6\hat{\mathbf{z}}$ and $\mathbf{B} = 4\hat{\mathbf{x}} - 1\hat{\mathbf{y}} + 2\hat{\mathbf{z}}$. Evaluate:**

a) $|\mathbf{A}| \equiv A$
b) $|\mathbf{B}| \equiv B$
c) $\mathbf{A} \cdot \mathbf{B}$
d) θ_b (the angle between these two vectors)
e) $\mathbf{A} \times \mathbf{B}$

2) **Calculate the partial derivatives with respect to x, y, and z, of the function:**

$$f(x, y, z) = 3y^2 \cos(x) + z$$

3) $\mathbf{Z} = 5 + 4i$.

a) Calculate $Z \times Z$. *Note: Regular multiplication of Z with itself — your answer should be a complex number.*
b) Calculate $(Z^* Z)^{1/2}$. *Note: Absolute square — your answer should be a real number.*

4) **Demonstrate that Euler's equation ($e^{ix} = \cos x + i \sin x$) is correct by taking the (regular) derivative of the following function, $f(x)$, and deducing the consequences.** *Hint: remember i is just a constant.*:

$$f(x) = e^{-ix}(\cos x + i \sin x)$$

5) **1.2**
6) **1.4**
7) **1.5**
8) **1.6**
9) **1.7**
10) **1.9**
11) **1.10**
12) **1.11**
13) **1.13**
14) **1.14**
15) **1.15**