Physics 438a

Spring 2025

Problem Set 1

Due Sunday, January 19 at 11:59 pm via Blackboard

1. Find the complex conjugate, mod square, real part, and imaginary part of $\frac{4}{2+3i}$
2. The rotation matrix in 2D is $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$. We can use this in the complex plane if we treat the real and imaginary parts of a complex number as two coordinates. Say we have a complex number $z = a + ib = r\, e^{i\phi}$. Show explicitly that multiplying by $e^{i\theta}$ is the same as a rotation by θ.*
3. If you roll a 6-sided die, what is:*
    a. The expected value of the sum of two consecutive rolls?
    b. The square of the expected value of a single roll?
    c. The expected value of the product of two consecutive rolls?
4. Griffiths 1.4

*Solved at least partially in class