

Physics 3041 (Spring 2021) Homework Set 5 (**Due 3/3**)

1. (a) Problem 9.1.6. (5 points)
- (b) Problem 9.2.1.(ii). (10 points)
- (c) Problem 9.2.3. (10 points)
2. Use  $\text{Tr } \sigma_i = 0$ ,  $\sigma_i^2 = I$ , and  $\sigma_i \sigma_j = i \sum_k \epsilon_{ijk} \sigma_k$  to obtain the components of a general  $2 \times 2$  matrix in the basis of  $\{\sigma_1, \sigma_2, \sigma_3, I\}$ , where  $\sigma_i$  represents the Pauli matrices and  $I$  is the identity matrix. (15 points)
3. Problem 9.2.5. (10 points)
4. Problem 9.3.5. (20 points)
5. Problem 9.5.6, but only for the proof without doing the inverse matrix part. (10 points)
6. Problem 9.5.10. (20 points)