Due Date: Thursday, November 10 at 5PM EDT

Carefully read and provide solutions to the problems below, showing all work required to justify any conclusions you make. You are encouraged to collaborate with your classmates, but all solutions turned in should be your own work. If you do collaborate, please record the names of those other students on your submitted work. Finally, your work should be submitted as a PDF on Canvas before the listed due date.

Textbook problems: Section 15.3 #4, 6, 8, 18; Section 15.4 #10, 28; Section 15.6 #4, 8, 12, 14, 22; Section 15.7 #18

Optional textbook problems: the odd numbered problems from Sections 15.3 - 15.4 and 15.6 - 15.7

Problem 1. (Lecture 15.3, Exercise 2) Convert these points (x, y) to polar coordinates.

$$\text{(a)} \quad (1, 0) \quad \text{(b)} \quad (0, -5) \quad \text{(c)} \quad (4, 3)$$

$$\text{(d)} \quad (1, 1) \quad \text{(e)} \quad (-2, 2) \quad \text{(f)} \quad \left(1, -\sqrt{3}\right)$$

Problem 2. (Lecture 15.3, Exercise 3) Convert these polar coordinates to standard (x, y) coordinates.

$$\text{(a)} \quad \left(1, \tfrac{\pi}{4}\right) \quad \text{(b)} \quad (5, 0) \quad \text{(c)} \quad (2, \pi)$$

$$\text{(d)} \quad \left(\tfrac{1}{2}, \tfrac{\pi}{6}\right) \quad \text{(e)} \quad \left(4, \tfrac{2\pi}{3}\right) \quad \text{(f)} \quad \left(1, \tfrac{5\pi}{4}\right)$$

Problem 3. (Lecture 15.3, Exercise 4) Modify our computation in class to find a formula for the volume of a sphere in 3 dimensions with radius $R > 0$.