This homework set has three (3) problems. Some of them are routine, others require more thought. You are encouraged to work with others and to ask questions of your instructor; however, you must write up your solutions independently. On this and all subsequent homework sets please write neatly in complete sentences. Writing mathematics is a craft, aim to hone this skill!

1. (a) The grain silo at Wilson’s farm is 90 ft tall and 40 ft in diameter. Farmer Wilson is a strapping 6'4” and 200 lb. How much work is required of farmer Wilson to walk to the top of the helical staircase encircling the silo? Does it matter how tightly the helix is wound? Explain.

(b) What if farmer Wilson carries a 25 lb bucket of paint which leaks steadily? Make any simplifying assumptions you feel necessary.

2. Stewart Exercises 17.4: 28

3. Find the positively oriented simple closed curve $C$ for which

$$\int_C (y^3 - y) \, dx - 2x^3 \, dy$$

comes out as large as possible.