

## Math 53: Quiz #9

April 18

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20 points, 25 minutes

Name: \_\_\_\_\_

Please give neat and organized answers. Whenever applicable (especially for computational questions), make it clear what strategy you are using. Points may be deducted for poor exposition.

### Problem 1

(10 points.) Let  $\mathbf{F}(x, y) = \langle 2x + y^2, x^3 + y^2 \rangle$ . Let  $C$  be the unit circle (positively oriented). Compute the flux of  $\mathbf{F}$  across  $C$ , i.e., the quantity  $\int_C \mathbf{F} \cdot \mathbf{n} \, ds$ .

(See back for next problem!)

**Problem 2**

(10 points.) Let  $S$  be the part of the graph of  $z = (x - 1)^2 + y^2$  that lies inside the cylinder  $x^2 + y^2 = 1$ . Give  $S$  the upward orientation (so think of the normal vectors to  $S$  as pointing upward). Let  $\mathbf{F}(x, y, z) = \langle 0, 0, z \rangle$ . Calculate the flux of  $\mathbf{F}$  across  $S$ , i.e., the quantity  $\iint_S \mathbf{F} \cdot d\mathbf{S}$ , or equivalently  $\iint_S \mathbf{F} \cdot \mathbf{n} \, dS$ .