

## Quiz 11

June 04, 2026:

Name: \_\_\_\_\_ Student ID number: \_\_\_\_\_

1. (34 pts) Compute the circulation  $\oint_C \mathbf{F} \cdot \mathbf{T} ds$  where  $\mathbf{F} = \frac{-y}{x^2 + y^2} \mathbf{i} + \frac{x}{x^2 + y^2} \mathbf{j}$  and  $C$  is the circle  $x^2 + y^2 = a^2$ ,  $a > 0$ .
2. (34 pts) Let  $\mathbf{F}(x, y) = (x, e^x)$ . Evaluate  $\oint_C \mathbf{F} \cdot \mathbf{n} ds$  where  $C$  is the ellipse  $\frac{x^2}{4} + y^2 = 1$  and  $\mathbf{n}$  is the outward unit normal.
3. (34 pts) Use any method to evaluate  $\int_C \mathbf{F} \cdot \mathbf{T} ds$  where  $\mathbf{F} = \frac{(2x, 4y, 6z)}{\sqrt{x^2 + 2y^2 + 3z^2}}$  and  $C$  consists of two line segments: from  $(1, 1, 1)$  to  $(2, 3, 4)$  then from  $(2, 3, 4)$  to  $(5, 4, 3)$ .