

### Math 251 Take home Quiz 3

(Time: 2 hours      Closed textbook      Due Dec 3rd)

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

1.(20 points) Evaluate the line integral, where  $C$  is the given curve.

(a)  $\int_C xyz ds,$

$C : x = 2\sin t, y = t, z = -2\cos t, 0 \leq t \leq \pi$

(b)  $\int_C y^3 ds,$

$C : x = t^3, y = t, 0 \leq t \leq 2$

2.(20 points) Use Green's theorem to evaluate the line integral along the given positively oriented curve.

$\int_C xy^2 dx + 2x^2 y dy,$  where  $C$  is the triangle with vertices  $(0,0), (2,2)$  and  $(2,4)$

3.(20 points) Use Green's theorem to evaluate  $\int_C \vec{F} \bullet d\vec{r}.$   
 $F(x, y) = (e^x + x^2 y, e^y - xy^2),$   $C$  is the circle  $x^2 + y^2 = 25$  oriented clockwise.

4.(20 points) find the curl and divergence of the vector field  $F(x, y, z) = x^2yz\vec{i} + xy^2z\vec{j} + xyz^2\vec{k}$

5.(20 points) Evaluate the integral  $\int \int \int_E \sqrt{x^2 + z^2} dV$ , where E is the region bounded by the paraboloid  $y = x^2 + z^2$  and the plane  $y = 4$ .