

Show all work. 5 points each.

1. (a) Show that  $\mathbf{F}(x, y) = \langle 2xy, x^2 + 1 \rangle$  is conservative, (b) find  $f(x, y)$  so  $\nabla f = \mathbf{F}$  and (c) use (b) to evaluate  $\int_C \mathbf{F} \cdot d\mathbf{r}$  where  $C: x = t, y = t^2$  with  $0 \leq t \leq 2$ .