

18.022 Recitation Quiz  
15 October 2014

1. Consider the function  $f(x) = \sqrt{1-x^2}$  over the interval  $[0, 1]$ . Write down a definite integral whose value is equal to the arclength of the graph of  $f$ .

2. Consider the function  $\mathbf{F} : \mathbb{R}^4 \rightarrow \mathbb{R}^2$  defined by  $\mathbf{F}(w, x, y, z) = (2/w^2 - y, 3x + \cos z)$ .

(a) Find  $D\mathbf{F}$ .

(b) Show that there exists an open set  $U \subset \mathbb{R}^2$  containing  $(1, 2)$  and a function  $\mathbf{f} : U \rightarrow \mathbb{R}^2$  such that for all  $x \in U$ , the equations  $\mathbf{F}(w, x, y, z) = \mathbf{F}(1, 2, 3, \pi/2)$  have a unique solution  $(y, z) = \mathbf{f}(w, x)$ . Show that  $\mathbf{f}$  is  $C^1$ .