

1. Section 4.1 #8
2. Let  $\gamma = \{(x, y) : y = x^{1/3} : -1 \leq x \leq 1\}$ .
  - (a) Sketch  $\gamma$ .
  - (b) Verify that  $\gamma$  is a smooth arc, by showing that  $z(t) = t + it^3$ ,  $-1 \leq t \leq 1$  is an admissible parameterization of  $\gamma$ .
3. Let  $\gamma = \{(x, y) : y = x^{2/3} : -1 \leq x \leq 1\}$ .
  - (a) Sketch  $\gamma$ .
  - (b) Show that  $z(t) = t^3 + it^2$ ,  $-1 \leq t \leq 1$  is a parameterization of  $\gamma$  that satisfies admissability properties i) and iii), but not ii).
  - (c) Show that  $\gamma$  is *not* a smooth arc. Hint: Suppose that  $z(t) = u(t) + iv(t)$  is a parameterization of  $\gamma$  such that  $z'(t)$  exists and is continuous. Show that for some  $t_0$ ,  $u(t_0) = 0 = v(t_0)$  and for this  $t_0$ ,  $u'(t_0) = 0 = v'(t_0)$ .
4. Section 4.2 #6
5. Section 4.2 #8
6. Let  $f(z) = \frac{z+1}{z}$ . For each of the following directed smooth curves, find an admissible parameterization and compute  $\int_{\gamma} f(z)dz$ .
  - (a) The semi-circle in the upper half-plane, centered at 0, with radius 1, in the clockwise direction.
  - (b) The semi-circle in the lower half-plane, centered at 0, with radius 1, in the clockwise direction.
  - (c) The circle, centered at 0, with radius 1, in the clockwise direction.
  - (d) The circle, centered at 0, with radius 1, in the counter-clockwise direction.
7. Section 4.2 #14
8. Section 4.3 #2
9. Section 4.3 #4
10. Section 4.3 #11