

8. (Cont.)

3RD SEGMENT

$$\vec{r}(t) = \begin{pmatrix} -2t+6 \\ y(t) \end{pmatrix} \quad 2 \leq t \leq 3$$

$$\int_C (x+2\sqrt{y}) \, ds$$

$$f(x,y) = x+2\sqrt{y}$$

$$f(x(t), y(t)) = 0 + 2\sqrt{-2t+6}$$

$$= 2\sqrt{-2t+6}$$

$$x'(t) = 0 \quad y'(t) = -2$$

$$= \int_2^3 2\sqrt{-2t+6} \sqrt{0^2 + (-2)^2} \, dt$$

$$= 2 \int_2^3 2(-2t+6)^{\frac{1}{2}} \, dt$$

$$u = -2t+6 \quad du = -2 \, dt$$

$$= 2(-1) \int_0^3 -2(-2t+6)^{\frac{1}{2}} \, dt$$

$$= -2 \int_{t=2}^{t=3} u^{\frac{1}{2}} \, du$$

$$= -2 \left[\frac{2}{3} u^{\frac{3}{2}} \right]_{t=2}^{t=3}$$

$$= -2 \cdot \frac{2}{3} \left[(-2t+6)^{\frac{3}{2}} \right]_{t=2}^{t=3}$$

$$= -\frac{4}{3} \left[0^{\frac{3}{2}} - 2^{\frac{3}{2}} \right]$$

$$= \frac{4}{3} \cdot \sqrt{2^3}$$

$$= \frac{4}{3} \cdot 2\sqrt{2}$$

$$= \frac{8\sqrt{2}}{3}$$

ENTIRE LENGTH

$$\frac{9}{2} + \frac{17\sqrt{13}}{6} + \frac{8\sqrt{2}}{3}$$

$$\frac{27}{6} + \frac{17\sqrt{13}}{6} + \frac{16\sqrt{2}}{6}$$

$$\frac{27 + 17\sqrt{13} + 16\sqrt{2}}{6}$$