1-16 Evaluate the line integral, where C is the given curve.

3. $\int_C xy^4\ ds$, C is the right half of the circle $x^2 + y^2 = 16$
7. $\int_C (x + 2y)\ dx + x^2\ dy$, C consists of the line segments from $(0, 0)$ to $(2, 1)$ and from $(2, 1)$ to $(3, 0)$
11. $\int_C xe^{yz}\ ds$, C is the line segment from $(0, 0, 0)$ to $(1, 2, 3)$
15. $\int_C z^2\ dx + x^2\ dy + y^2\ dz$, C is the line segment from $(1, 0, 0)$ to $(4, 1, 2)$

19-22 Evaluate the line $\int_C \mathbf{F} \cdot d\mathbf{r}$, where C is given by the vector function $\mathbf{r}(t)$.

19. $\mathbf{F}(x, y) = xy^2\mathbf{i} - x^2\mathbf{j},\ \mathbf{r}(t) = t^3\mathbf{i} + t^2\mathbf{j},\ 0 \le t \le 1$
21. $\mathbf{F}(x, y, z) = \sin(x)\mathbf{i} + \cos(y)\mathbf{j} + xz\mathbf{k}, \mathbf{r}(t) = t^3\mathbf{i} - t^2\mathbf{j} + t\mathbf{k},\ 0 \le t \le 1$

41. Find the work done by the force field

$$\mathbf{F}(x, y, z) = \langle x - y^2, y - z^2, z - x^2 \rangle$$

on a particle that moves along the line segment from $(0, 0, 1)$ to $(2, 1, 0)$.

43. The position of an object with m at time t is $\mathbf{r}(t) = \langle at^2, bt^3 \rangle$, $0 \le t \le 1$.

(a) What is the force acting on the object at time t?

(b) What is the work done by the force during the time interval $0 \le t \le 1$?