Homework Section 16.2

1. Evaluate the line integral over the given curve C:

   a) $\int_C 8\sqrt{x}\, ds$, C: $x = t^2$, $y = t$, $0 \le t \le 2$

   b) $\int_C x^4 y\, ds$, C is the upper half of the circle $x^2 + y^2 = 16$

   c) $\int_C (xy + \ln y)\, dx$, C is the arc of the parabola $x = y^2$ from (1, 1) to (9, 3)

   d) $\int_C (x + y)\, dx + xy\, dy$, C consists of line segments from (0, 0) to (1, 1) and from (1, 1) to (2, 3)

   e) $\int_C ye^{xz}\, ds$, C is the line segment from (0, 0, 0) to (2, 1, 3)

2. Compute the line integral $\int_C \mathbf{F} \bullet d\mathbf{r}$, where C is given by the vector function $\mathbf{r}(t)$.

   a) $\mathbf{F}(x, y) = xy^2\mathbf{i} - x\sqrt{y}\,\mathbf{j}$, $\mathbf{r}(t) = t^3\mathbf{i} + t^2\mathbf{j}$, $0 \le t \le 1$

   b) $\mathbf{F}(x, y, z) = \cos(x)\mathbf{i} + 2y\mathbf{j} + xz\,\mathbf{k}$, $\mathbf{r}(t) = t^2\mathbf{i} - t^3\mathbf{j} + 4t\,\mathbf{k}$, $0 \le t \le 1$

3. Find the work done by the force field $\mathbf{F}(x, y) = xy\mathbf{i} - y\mathbf{j}$ in moving a particle along a quarter of the unit circle from (1, 0) to (0, 1).

4. The figure shows a vector field **F** and two line segments C_1 and C_2. Determine if the respective line integrals of **F** over C_1 and C_2 are positive, negative, or zero. Explain your answers.