Evaluate the line integral, where C is the given curve.

1) $\int_C y\,ds$, $C:\ x=t^2,\ y=t,\ 0\le t\le 2$

$$\boxed{\frac{1}{12}\left(17\sqrt{17}-1\right)}$$

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

$$\boxed{\frac{8192}{5}}$$

3) $\int_C xe^{yz}\,ds$, C is the line segment from $(0,\ 0,\ 0)$ to $(1,\ 2,\ 3)$.

$$\boxed{\frac{\sqrt{14}}{12}\left(e^6-1\right)}$$

4) $\int_C xy\ dx + (x-y)\ dy$, C consist of the line segments from $(0,\ 0)$ to $(2,\ 0)$ and from $(2,\ 0)$ to $(3,\ 2)$.

$$\boxed{\frac{17}{3}}$$

5) $\int_C x^2\ dx + y^2\ dy + z^2\ dz$, C consist of the line segments from $(0,\ 0,\ 0)$ to $(1,\ 2,\ -1)$ and from $(1,\ 2,\ -1)$ to $(3,\ 2,\ 0)$.

$$\boxed{\frac{35}{3}}$$

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

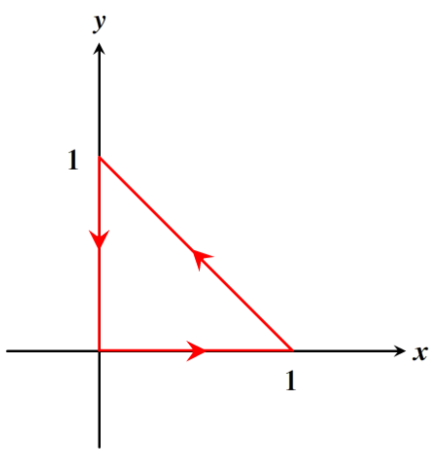
6) $\vec{\mathbf{F}}(x,\ y) = x^2 y^3\ \mathbf{i} - y\sqrt{x}\ \mathbf{j}$, $\quad \vec{\mathbf{r}}(t) = t^2\ \mathbf{i} - t^3\ \mathbf{j}$, $\quad 0 \le t \le 1$

$$\boxed{-\frac{59}{105}}$$

7) $\vec{\mathbf{F}}(x, y, z) = z\,\mathbf{i} + y\,\mathbf{j} - x\,\mathbf{k}$, $\vec{\mathbf{r}}(t) = t\,\mathbf{i} + \sin t\,\mathbf{j} + \cos t\,\mathbf{k}$, $0 \le t \le \pi$

$$\boxed{\pi}$$

8) Find the work done by the force field $\vec{\mathbf{F}}(x, y) = x\,\mathbf{i} + y\,\mathbf{j}$ on a particle that moves along the path shown below.



$$\boxed{\text{Work} = 0}$$

9) Find the work done by the force field $\vec{\mathbf{F}}(x, y) = \left\langle x^2 + y,\ 2xy \right\rangle$ on a particle that moves along the circle centered at the origin with radius 2 oriented counterclockwise beginning at $(2,\ 0)$ and completing one cycle around the circle.

$$\boxed{\text{Work} = -4\pi}$$