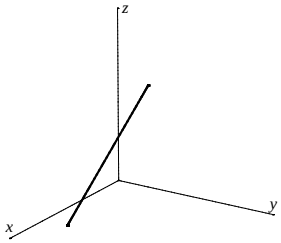
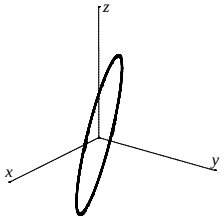
Vector-Valued Functions

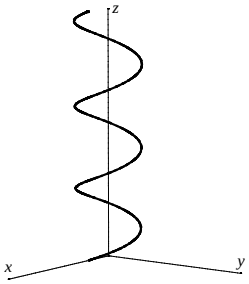
1. Here are several curves.



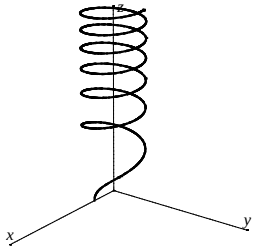
(I)



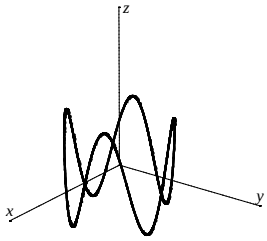
(II)



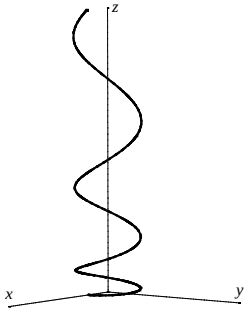
(III)



(IV)



(V)



(VI)

Find the curve parameterized by each vector-valued function.

(a) $\vec{r}(t) = \langle \cos t, \sin t, t \rangle$.

(b) $\vec{r}(s) = \langle \cos s, \sin s, \sin 4s \rangle$.

(c) $\vec{r}(s) = \langle \cos s, \sin s, 4 \sin s \rangle$.

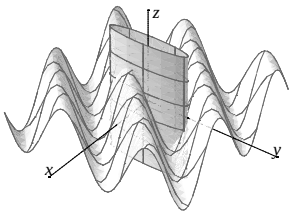
(d) $\vec{r}(u) = \langle \cos u^3, \sin u^3, u^3 \rangle$.

(e) $\vec{r}(u) = \langle 3 + 2\cos u, 1 + 4\cos u, 2 + 5\cos u \rangle$.

2. Let L be the line tangent to curve (III) at the point $(1, 0, 2\pi)$. Find parametric equations for L.

3. A fly is sitting on the wall at the point $(0, 1, 3)$. At time $t = 0$, he starts flying; his velocity at time t is given by $\vec{v}(t) = \langle \cos 2t, e^t, \sin t \rangle$. Find the fly's location at time t.

4. (a) The surfaces $9x^2 + \frac{y^2}{4} = 1$ and $z = \sin(x - y)$ intersect in a curve. Find a parameterization of the curve.



(b) The surfaces $z = \sin(x - y)$ and $y = 2x$ intersect in a curve. Find a parameterization of the curve.