Homework Assignment 7 - (11.1) –Calculus of Vector-Values Functions - Solutions

Page 862: - turn in the problems with (*)

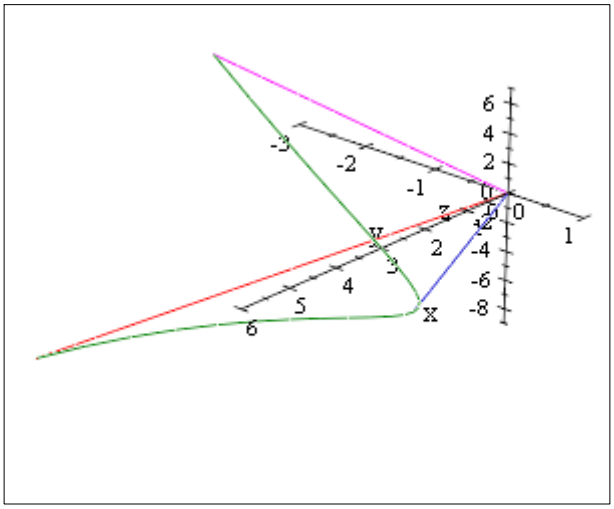
1,2*, 5, 6*, 7, 8*, 9, 10*, 15, 16*

19-30, 23*, 33*, 37*

- use either calculator or Scientific Notebook

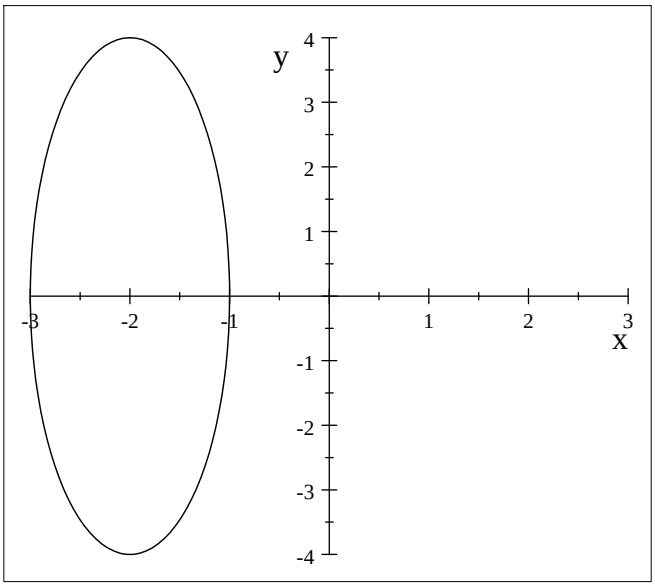
2.

$\vec{r}(t) = \langle 4 - t,\ 1 - t^2,\ t^3 - 1 \rangle$
$\vec{r}(-2) = \langle 6,\ -3,\ -9 \rangle$
$\vec{r}(0) = \langle 4,\ 1,\ -1 \rangle$
$\vec{r}(2) = \langle 2,\ -3,\ 7 \rangle$



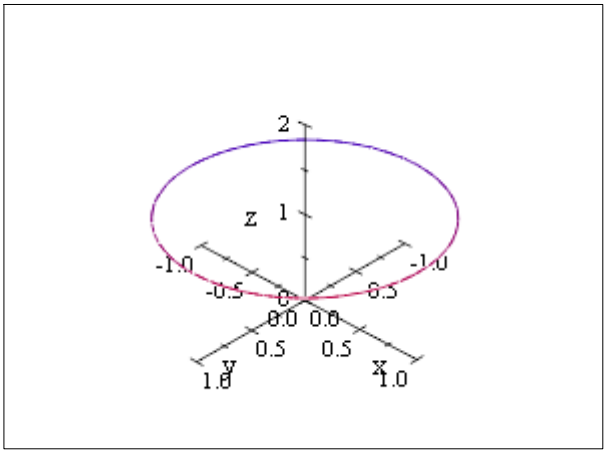
6.

$\vec{r}(t) = \langle \sin t - 2,\ 4\cos t \rangle$
$x + 2 = \sin(t),\ \frac{y}{4} = \cos(t)$
since $(x+2)^2 + \frac{y^2}{16} = \sin^2(t) + \cos^2(t) = 1,$
the curve is an shifted ellipse.



8.

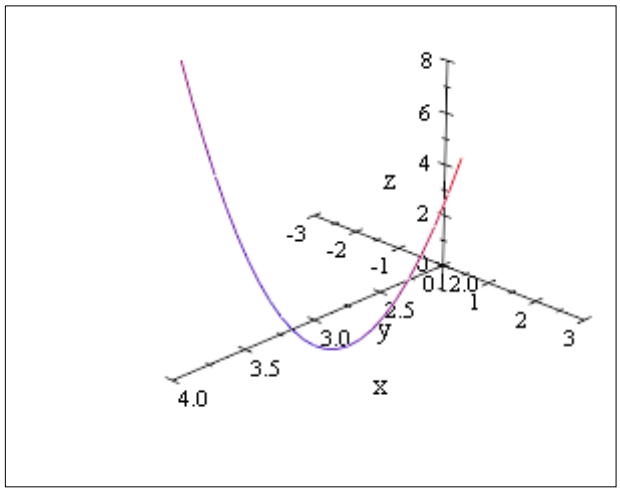
$\vec{r}(t) = \langle \cos 2t, \sin 2t, 1 \rangle$
Since $x^2 + y^2 = \cos^2(2t) + \sin^2(2t) = 1,$
the curve is a unit circle.
Since $z = 1,$ the circle is in the plane
$z = 1.$



10. $\vec{r}(t) = \langle 3, t, t^2 - 1 \rangle$

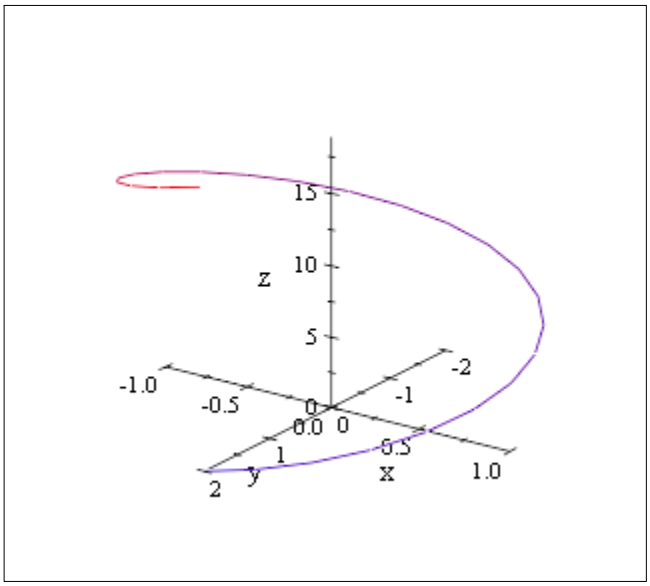
Since $x = 3,$ the curve is in the plane $x = 3.$

Since $z = y^2 - 1,$ the curve is a parabola.



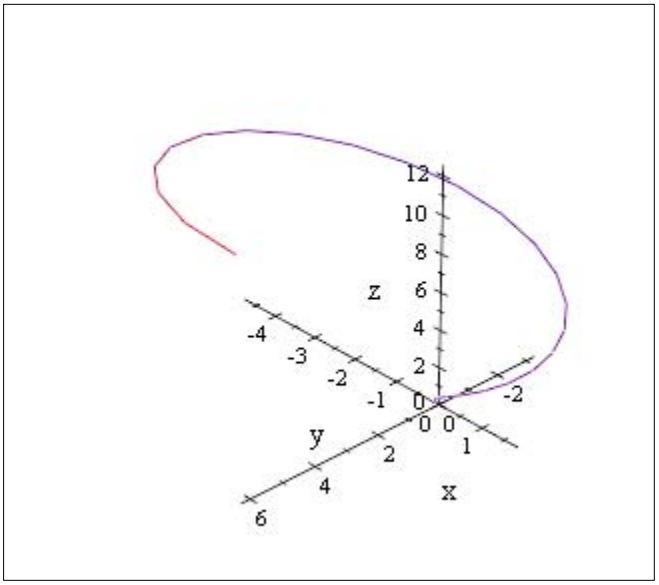
16.

$\vec{r}(t) = \langle 2\cos(t),\ \sin(t),\ 3t \rangle$



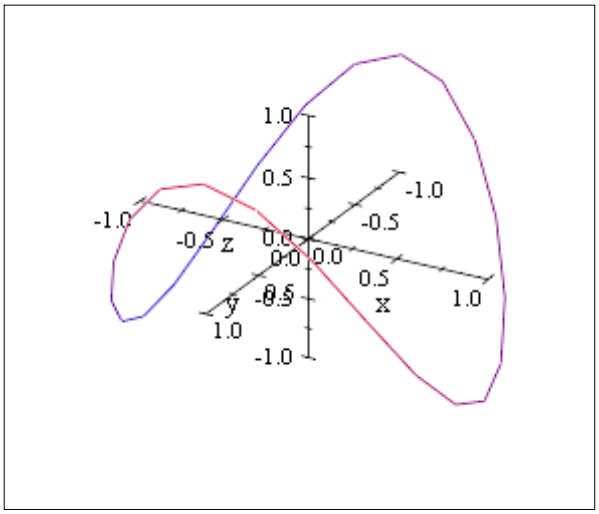
23.

$\vec{r}(t) = \langle [t\cos(t),\ t\sin(t),\ 2t] \rangle$



33.

$\vec{r}(t) = \langle \cos t, \sin t,\ \cos(2t) \rangle,\ 0 \le t \le 2\pi$
$\vec{r}\,'(t) = \langle -\sin t, \cos(t), -2\sin(2t) \rangle$
$L = \int_0^{2\pi} \sqrt{\sin^2(t) + \cos^2(t) + 4\sin^2(2t)}\, dt$
$= 10.\,540\,7$



37.

$\vec{r}(t) = \langle t, t^2 - 1, t^3 \rangle,\ 0 \le t \le 2$
$\vec{r}\,'(t) = \langle 1, 2t, 3t^2 \rangle$
$L = \int_0^2 \sqrt{1 + 4t^2 + 9t^4}\, dt5$
$= 9.\,570\,57$