Math 60
HW 4
Friday, May 20, 2016

3.1.{3, 10, 17}, 3.2.{1, 4, 13}, 3.3.{9, 18, 20}

**3.1.3** In Exercises 1-6, sketch the images of the following paths, using arrows to indicate the direction in which the parameter increases:

$$\begin{cases} x = t\cos t \\ y = t\sin t \end{cases}, \quad -6\pi \le t \le 6\pi$$

■

**3.1.10** Calculate the velocity, speed, and acceleration of the paths given in Exercises 7-10.

$$\mathbf{x}(t) = (e^t, e^{2t}, 2e^t)$$

■

**3.1.17** In Exercises 15-18, find an equation for the line tangent to the given path at the indicated value for the parameter.

$$\mathbf{x}(t) = (t^2, t^3, t^5), t = 2$$

■

**3.2.1** Calculate the length of each of the paths given in Exercises 1-6.

$$\mathbf{x}(t) = (2t + 1, 7 - 3t), -1 \leq t \leq 2$$

■

**3.2.4** Calculate the length of each of the paths given in Exercises 1-6.

$$\mathbf{x}(t) = 7\mathbf{i} + t\mathbf{j} + t^2\mathbf{k}, 1 \leq t \leq 3$$

■

**3.2.13** This problem concerns the path $\mathbf{x} = |t-1|\mathbf{i} + |t|\mathbf{j}, -2 \leq t \leq 2$.

(a) Sketch this path.

(b) The path fails to be of class $C^1$ but is piecewise $C^1$. Explain.

(c) Calculate the length of the path.

■

**3.3.9** In Exercises 7-12, sketch the given vector field on $\mathbb{R}^3$. *Note:* describe in addition to sketch.

$$\mathbf{F} = (0, z, -y)$$

■

**3.3.18** In Exercises 17-19, verify that the path given is a flow line of the indicated vector field. Justify the result geometrically with an appropriate sketch.

$$\mathbf{x}(t) = (\sin t, \cos t, 2t), \mathbf{F} = (y, -x, 2)$$

■

**3.3.20** In Exercises 20-22, calculate the flow line **x**(t) of the given vector field **F** that passes through the indicated point at the specified value of $t$.

$$\mathbf{F}(x, y) = -x\mathbf{i} + y\mathbf{j}; \quad \mathbf{x}(0) = (2, 1)$$

■