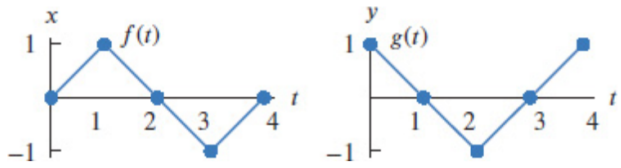
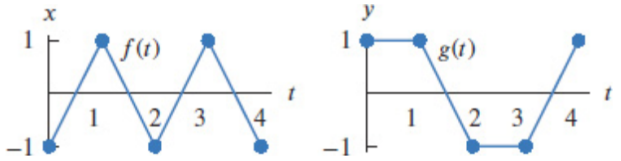
1. Sketch a graph of the path of the particle in the plane.



(a)



(b)

2. Write a parameterization for each curve in the xy-plane.

   (a) A circle of radius 3 centered at the origin and traced out clockwise.

   (b) A vertical line through the point $(-2, -3)$.

   (c) A circle of radius 5 centered at the point $(2, 1)$ and traced out counterclockwise.

   (d) A circle of radius 2 centered at the origin traced clockwise starting from $(-2, 0)$ when $t = 0$.

   (e) The line through the points $(2, -1)$ and $(1, 3)$.

3. I have given the parameterization, describe in words how the circle is traced out, including when and where the particle is moving clockwise and when and where the particle is moving counterclockwise.

   (a) $x = \cos t$ and $y = -\sin t$

4. In these problems the parameteric equations describe the motion of a particle. Find an equation for the curve along which the particle moves.

   (a) $x = 3t + 1$ and $y = t - 4$

   (b) $x = t^2 + 3$ and $y = t^2 - 2$

   (c) $x = t + 4$ and $y = t^2 - 3$

5. Find an equation of the tangent line to the curve for the given value of t.

$$x = t^3 - t, y = t^2 \text{ when } t = 2.$$

6. Find the sped for the given motion of a particle. Find any times when the particle comes to a stop.

$$x = \cos\left(t^2\right), y = \sin\left(t^2\right).$$

7. The position of a particle at time t is given by $x = e^t$ and $y = 2e^{2t}$.

   (a) Find dy/dx in terms of t.

   (b) Eliminate the parameter and write y in terms of x.

   (c) Using your answer to part b), find dy/dx in terms of x.

8. At time t, the position of a particle moving on a curve is given by $x = e^{2t} - e^{-2t}$ and $y = 3e^{2t} + e^{-2t}$.

   (a) Find all values of t at which the curve has a horizontal or vertical tangent.

   (b) Find dy/dx in terms of t.

   (c) Find $\lim_{t\to\infty} dy/dx$.