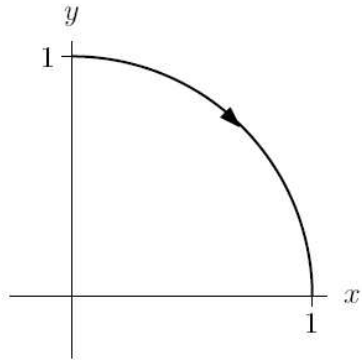


# Classroom Voting Questions: Multivariable Calculus

## 17.1 Parameterized Curves

1. Which of the following is an equation of a line in three dimensions  $(x, y, z)$ ?
  - (a)  $x = 4$
  - (b)  $y = 2x + 3$
  - (c)  $z = 3x + 2y + 7$
  - (d) All of the above
  - (e) None of the above
  
2. Which of the following best describes the path of a particle defined by the parametric equations  $x(t) = \cos(t^2)$ ,  $y(t) = \sin(t^2)$ ?
  - (a) a circle around which the particle moves faster and faster
  - (b) a parabola on which the particle travels at constant speed
  - (c) a parabola on which the particle travels faster and faster
  - (d) a circle on which the particle moves slower and slower
  
3. Which of the following is not a parametrization of the entire curve  $y = x^3$ ?
  - (a)  $x(t) = t; y(t) = t^3$
  - (b)  $x(t) = t^2; y(t) = t^6$
  - (c)  $x(t) = t^3; y(t) = t^9$
  - (d)  $x(t) = 2t; y(t) = 8t^3$
  
4. What does the path of the particle described by  $x(t) = \cos(t)$ ,  $y(t) = \sin(t)$ ,  $z(t) = -t$  look like?
  - (a) a circle in the  $xz$  plane
  - (b) a helix on which the particle is traveling up
  - (c) a helix on which the particle is traveling down
  - (d) a sine wave in the  $xz$  plane

5. Which of the following parameterizations does not describe the quarter circle in the figure below?



- (a)  $(\cos t, \sin t), 0 \leq t \leq \pi/2$   
(b)  $(\sin t, \cos t), 0 \leq t \leq \pi/2$   
(c)  $(-\cos t, \sin t), \pi/2 \leq t \leq \pi$   
(d)  $(\cos t, -\sin t), 3\pi/2 \leq t \leq 2\pi$
6. Let  $(\cos at, \sin at)$  be the position at time  $t$  seconds of a particle moving around a circle, where  $a > 0$ . If  $a$  is increased,
- (a) The radius of the circle increases.  
(b) The speed of the particle increases.  
(c) The center of the circle changes.  
(d) The path ceases to be a circle.
7. Let  $(a \cos t, a \sin t)$  be the position at time  $t$  seconds of a particle moving around a circle, where  $a > 0$ . If  $a$  is increased,
- (a) The radius of the circle increases.  
(b) The speed of the particle increases.  
(c) The center of the circle changes.  
(d) The path ceases to be a circle.
8. Which of the following parametric curves does not trace out the unit circle?
- (a)  $(\cos t, \sin t), 0 \leq t \leq 2\pi$   
(b)  $(\sin^2 t, \cos^2 t), 0 \leq t \leq 2\pi$   
(c)  $(\sin(t^2), \cos(t^2)), 0 \leq t \leq 2\pi$

(d)  $(\sin(2t), \cos(2t)), 0 \leq t \leq 2\pi$

9. Which of the following parametric paths describe particles that are not traveling along a straight line in 3-space?

(a)  $(1 - t, 2 + 2t, 3 - t)$

(b)  $(1 - t^2, 2 + 2t^2, 3 - t^2)$

(c)  $(1, 2, 1 - t)$

(d)  $(1, t, 1 - t^2)$

(e) More than one of the above

10. The value of  $c$  for which the lines  $l(t) = (c + 4t, 2 - t, 3 + t)$  and  $m(t) = (4t, 1 - 8t, 4 + 4t)$  intersect is

(a) 4

(b) 0

(c) -4

(d) There is no such  $c$ .