Classroom Voting Questions: Precalculus

Parametric Equations

1. The graph of the line $y = 2x$ can be represented with the parametric equations $x(t) = t$ and $y(t) = 2t$. As t increases, from which direction is this line traced out in the xy-plane?

   (a) The line is traced from left to right.

   (b) The line is traced from right to left.

   (c) This cannot be determined.

2. The graph of the line $y = 2x$ can also be represented with the parametric equations $x(t) = -t$ and $y(t) = -2t$. As t increases, from which direction is this line traced out in the xy-plane?

   (a) The line is traced from left to right.

   (b) The line is traced from right to left.

   (c) This cannot be determined.

3. The graph of the line $y = 2x$ can also be represented with the parametric equations $x(t) = t^3$ and $y(t) = 2t^3$. Consider the segment of this line from the point $(1, 2)$ to the point $(27, 54)$. If t represents time, how does the rate at which the line segment is traced out using this parameterization change as the value of t increases from $t = 1$ to $t = 3$?

   (a) The line is traced out more rapidly as t increases.

   (b) The line is traced out more slowly as t increases.

   (c) The rate does not change.

   (d) This cannot be determined.

4. The graph of the line $y = 2x$ can also be represented with the parametric equations $x(t) = t^3$ and $y(t) = 2t^3$. Consider the segment of this line from the point $(1, 2)$ to the point $(27, 54)$. If t represents time, how does the rate at which the line segment is traced out using this parameterization compare to the rate at which it is traced out using the parameterization $x(t) = t$, $y(t) = 2t$?

   (a) The line is traced out more rapidly using $x(t) = t^3$ and $y(t) = 2t^3$.

(b) The line is traced out more slowly using $x(t) = t^3$ and $y(t) = 2t^3$.

(c) The rate does not change.

(d) This cannot be determined.

5. True or False: Any given curve in the xy-plane can be represented with a unique pair of parametric equations.

   (a) True, and I am very confident.

   (b) True, but I am not very confident.

   (c) False, but I am not very confident.

   (d) False, and I am very confident.

6. Find a parametric representation for the curve $y = x^2$.

   (a) $x(t) = t$ and $y(t) = t^2$

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

   (c) $x(t) = 1 - t$ and $y(t) = 1 - 2t + t^2$

   (d) more than one of the above

   (e) all of the above

7. Motion around the unit circle $x^2 + y^2 = 1$ can be represented by the parametric equations $x(t) = \cos t$ and $y(t) = \sin t$. In which direction is the motion around the circle as t increases?

   (a) The motion is clockwise.

   (b) The motion is counterclockwise.

   (c) The direction of motion cannot be determined with the given information.

8. Which of the following parameterizations would represent motion around the unit circle at twice the rate of the parametrization $x(t) = \cos t$ and $y(t) = \sin t$?

   (a) $x(t) = 2\cos t$ and $y(t) = 2\sin t$

   (b) $x(t) = \frac{1}{2}\cos t$ and $y(t) = \frac{1}{2}\sin t$

   (c) $x(t) = \cos(2t)$ and $y(t) = \sin(2t)$?

   (d) $x(t) = \cos\left(\frac{1}{2}t\right)$ and $y(t) = \sin\left(\frac{1}{2}t\right)$?