

# Unit 1 1.3 AP Calculus BC

## Parametric Equations

Name: \_\_\_\_\_

### Multiple-Choice Questions

No calculator is allowed for these questions.

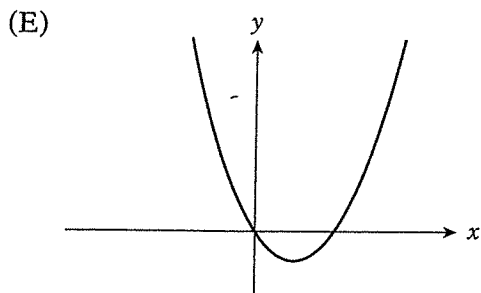
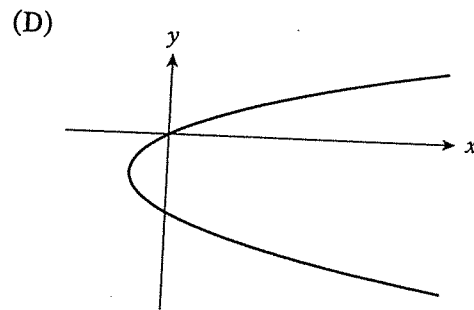
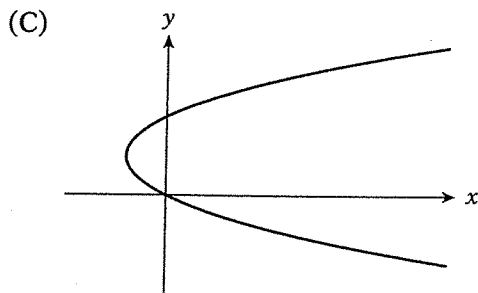
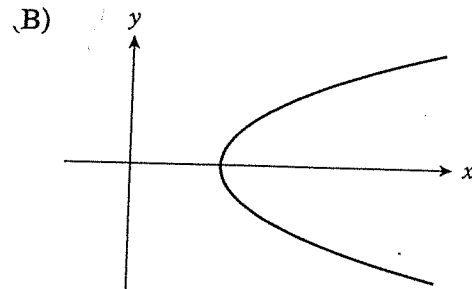
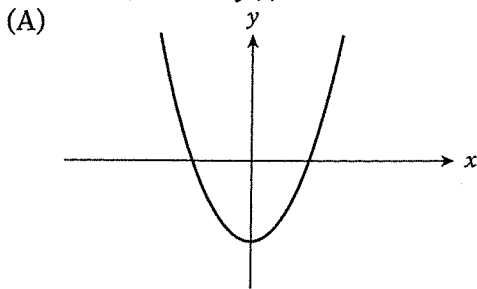
1. For the pair of parametric equations  $x(t) = 2 \cos t$  and  $y(t) = \sin t$ , eliminating the parameter gives which equation in the variables  $x$  and  $y$ ?

- (A)  $x^2 + y^2 = 4$
- (B)  $x^2 - y^2 = 4$
- (C)  $x^2 + 4y^2 = 4$
- (D)  $4x^2 + y^2 = 4$
- (E)  $4x^2 - y^2 = 4$

2. For the pair of parametric equations  $x(t) = t^2 + t$  and  $y(t) = t$ , eliminating the parameter gives which equation in the variables  $x$  and  $y$ ?

- (A)  $y^2 = x + y$
- (B)  $y^2 = x - y$
- (C)  $x^2 + x = y$
- (D)  $y^2 = x^2 + y$
- (E)  $x - y = t$

3. Which of the following is a part of the graph given by the system of parametric equations  $x(t) = t^2 + 2t$  and  $y(t) = t$ ?



4. The parametric equations  $x(t) = 2t + 1$  and  $y(t) = t - 1$ , for  $t$  in the interval  $[0, 4]$ , is the equation of
- (A) a line
  - (B) a ray
  - (C) a line segment
  - (D) a circle
  - (E) a parabola

### Free-Response Questions

*No calculator is allowed for these questions.*

1. Given the parametric equations, sketch the curve and indicate the direction of increasing  $t$ .

$$x(t) = 2 \cos t \text{ and } y(t) = \sin t,$$

for  $t$  in the interval  $[0, \pi]$ .

2. Sketch the graph of the parametric equations, indicating the direction of increasing  $t$ , and use the graph to identify the curve.

$$x(t) = t^2 + 1 \text{ and } y(t) = t - 1,$$

for  $t$  in the interval  $[-3, 3]$ .

**Example 15:** Graph the parametric equation  $x = 1 + 2t$ ,  $y = 2 - t^2$  and convert it to rectangular form.

## PROBLEM SET

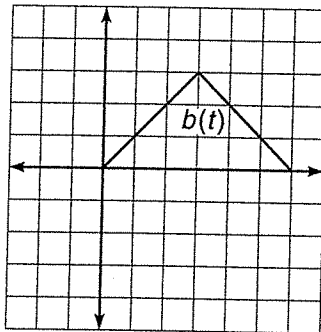
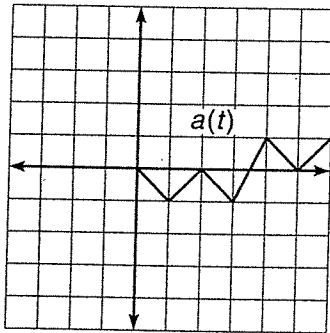
*A graphing calculator is required.*

1. Draw the graphs of the following parametric equations and rewrite each in rectangular form:

(a)  $x = 3\cos \theta$ ,  $y = 2\sin \theta$

(b)  $x = t - 1, y = 2 - \frac{2}{t}$

2. Given the graphs below, draw the graph of the parametric equations  $x = a(t)$ ,  $y = b(t)$ .



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3. Write the parametric equations for the following.

a) a line passing through the points  $(2, -1)$  and  $(-1, 5)$

b) a line segment from  $(2, -1)$  to  $(2, -6)$

c) a semi-circle with radius 2 for  $x \leq 0$

d) an ellipse given by the equation  $4x^2 + \frac{y^2}{9} = 1$