

Name: _____ Date: _____

Unit 4A CA – Functions Involving Parameters, Vectors, and Matrices

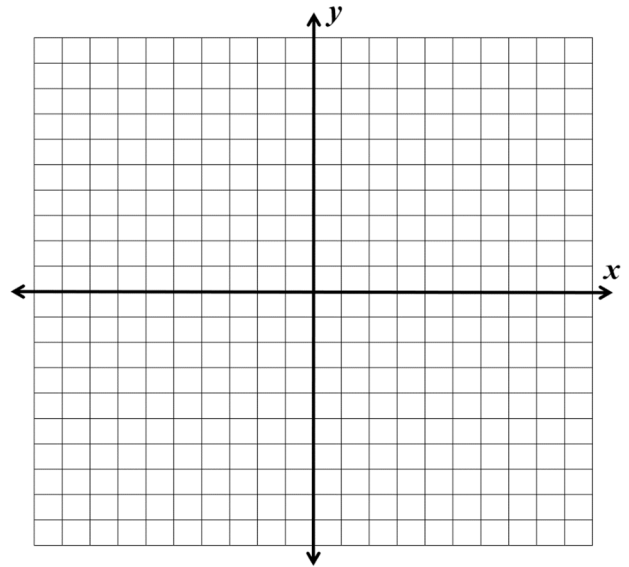
1. Complete the table of numerical values for the given values of
- t
- using the parametric function

$$f(t) = ((t - 1)^2, t - 1).$$

t	-1	0	1	2	3	4
x						
y						

2. Sketch the curve represented by the parametric function

$$f(x) = (t^2, 2 - t), 0 \leq t \leq 3$$



3. A particles position for a given value of
- t
- can be found using the parametric equations
- $x(t) = t + 2$
- and
- $y(t) = t^2 + 4$
- , over the interval
- $-2 \leq t \leq 0$
- . Find the following.

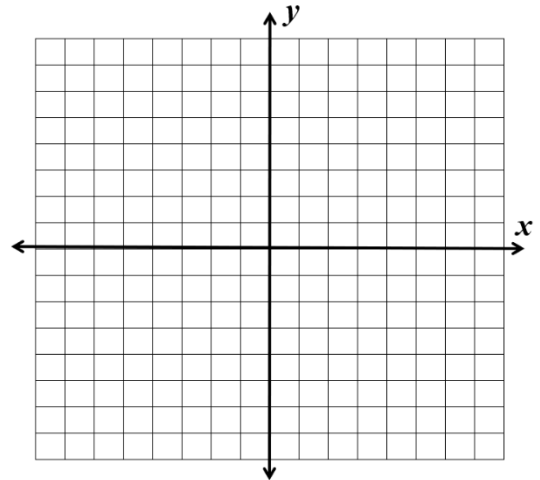
a. The average rate of change of $x(t)$.b. The average rate of change of $y(t)$.c. The slope of the line between the points on the graph that correspond to $t = -2$ and $t = 0$.

4. An object is moving in the xy -plane so that at any time t , the position of the object can be found by evaluating the parametric equations $x(t) = t$ and $y(t) = -(t + 2)^2 + 4$.

a. Graph the curve represented by the given parametric function for the restricted domain $-5 \leq t \leq 1$.

b. Find the horizontal relative extrema.

c. Find the vertical relative extrema.



d. Find the x -intercept(s). Show your work.

e. Find the y -intercept(s). Show your work.

5. Without the use of technology, determine which set of parametric equations will produce the same path as $f(t) = (t^2 - 2t + 1, 1 - t)$, but will have a direction of particle motion in the opposite direction?

(A) $x(t) = t^2 + 2t + 1, y(t) = 1 + t$

(B) $x(t) = -t^2 + 2t + 1, y(t) = 1 + t$

(C) $x(t) = -t^2 - 2t + 1, y(t) = 1 - t$

(D) $x(t) = 1 - t, y(t) = t^2 + 2t + 1$

6. Find the parametric equations for the circle with the center at $(2, 4)$ and a radius of 2.

7. Find the parametric equations for the linear path of a particle that travels from the point $(-4, 3)$ to the point $(2, 0)$.
8. Which of the following conditions indicates a vertical interval in the graph of an implicitly defined function. The points are considered to be close together.
- (A) The ratio of the change in y to x is negative.
 - (B) The ratio of the change in x to y is positive.
 - (C) The ratio of the change of x to the change in y is zero.
 - (D) The ratio of the change of y to the change in x is zero.
 - (E) None of the above.
9. Find the vertex and orientation for the parabola given by $(x + 9) = -\frac{2}{3}(y + 1)^2$.
10. Find the vertex and orientation for the parabola $x^2 - 4x + 2y - 5 = 0$. Show all your work to support your answer.
11. Which of the following represents a parametrization of the parabola given by the equation $x^2 - 4x + 8 - 2y = 0$.
- (A) $(t^2 - 2t + 4, t)$
 - (B) $(t, t^2 - 2t + 4)$
 - (C) $(t, \frac{1}{2}t^2 - 2t + 4)$
 - (D) $(t, \frac{1}{2}t^2 - 4t + 8)$

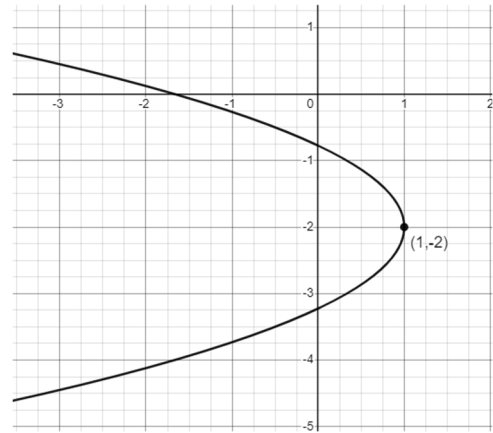
12. Which of the following is the equation of the parabola shown.

(A) $(x + 1) = \frac{2}{3}(y + 2)^2$

(B) $(x - 1) = -\frac{2}{3}(y + 2)^2$

(C) $(y + 1) = \frac{2}{3}(x + 2)^2$

(D) $(y - 1) = -\frac{2}{3}(x - 2)^2$



13. Use the equation $\frac{(x-2)^2}{16} + \frac{(y-5)^2}{4} = 1$ to find the following.

a. center

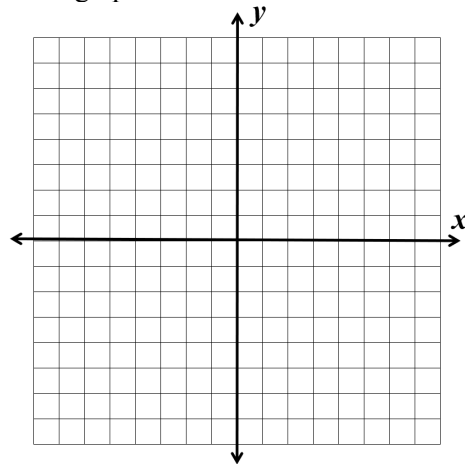
b. horizontal or vertical

c. vertices (ends of major axis)

d. ends of minor axis

e. foci

f. sketch the graph



14. Put the equation of an ellipse into standard form and then identify the center, foci, vertices and orientation of the ellipse. $25x^2 + y^2 - 50x - 4y + 4 = 0$.

15. Use the equation $\frac{(x-1)^2}{4} - \frac{(y+2)^2}{9} = 1$ to find the following.

a. center

b. horizontal/vertical

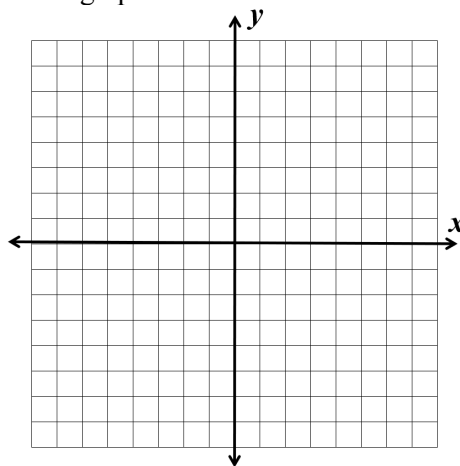
c. Find the length of the transverse axis.

d. Find the length of the conjugate axis.

e. vertices

f. foci

g. sketch the graph



16. Put the equation of an ellipse into standard form and then identify the center, foci, vertices and orientation of the hyperbola. $y^2 - 25x^2 - 4y - 50x + 4 = 0$.

17. Find the parametrization of the ellipse given by $\frac{(x-1)^2}{16} + \frac{(y-2)^2}{25} = 1$.

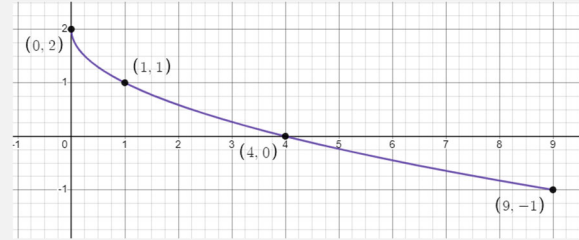
18. Find the parametrization of the hyperbola given by $\frac{x^2}{9} - \frac{y^2}{36} = 1$

Answers to Unit 4A Corrective Assignment

1.

t	-1	0	1	2	3	4
x	4	1	0	1	4	9
y	-2	-1	0	1	2	3

2.

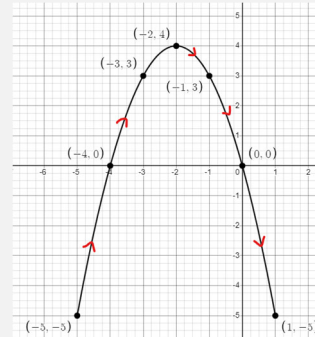


Limited domain, no arrows on endpoints!

3.

- a. The average rate of change of $x(t) = 1$
- b. The average rate of change of $y(t) = -2$
- c. Slope = -2

4a.



- 4b. Horizontal Relative Min -5 when $t = -5$
Horizontal Relative Max 1 when $t = 1$

- 4c. Vertical Relative Min -5 when $t = -5$ and $t = 1$
Vertical Relative Max 4 when $t = -2$

- 4d. x -intercepts $(-4, 0), (0, 0)$ when $t = -4$ and $t = 0$

- 4e. y -intercept $(0, 0)$ when $t = 0$

5. A

6. $x(t) = 2 + 2 \cos t$ and $y(t) = 4 + 2 \sin t$

7. $x(t) = -4 + 6t$ and $y(t) = 3 - 3t$

8. C

9. $(-9, -1)$, opens to the left

10. $(2, \frac{9}{2})$, opens down

11. C

12. B

13a. Center $(2, 5)$

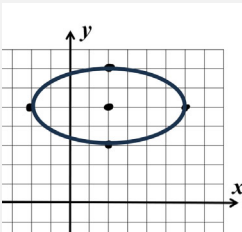
13b. Horizontal

13c. Vertices: $(6, 5), (-2, 5)$

13d. Minor Axis length = 4

13e. Foci: $(2 \pm 2\sqrt{3}, 5)$

13f.



14a. $\frac{(x-1)^2}{1} + \frac{(y-2)^2}{25} = 1$

14b. Center: $(1, 2)$

14c. Foci: $(1 \pm 2\sqrt{6}, 2)$

14d. Vertices: $(1, 7), (1, -3)$

14e. Vertical

15a. Center: $(1, -2)$

15b. Horizontal

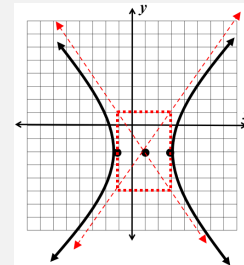
15c. Transverse axis: 4

15d. Conjugate axis: 6

15e. Vertices: $(-1, -2), (3, -2)$

15f. Foci: $(1 \pm \sqrt{13}, -2)$

15g.



16. $\frac{(x+1)^2}{1} - \frac{(y-2)^2}{25} = 1$

Center: $(-1, 2)$

Foci: $(-1 \pm \sqrt{26}, 2)$

Vertices: $(0, 2), (-2, 2)$

Horizontal

17. $x(t) = 1 + 4 \cos t, y(t) = 2 + 5 \sin t, 0 \leq t \leq 2\pi$

18. $x(t) = 3 \sec t, y(t) = 6 \tan t, 0 \leq t \leq 2\pi$