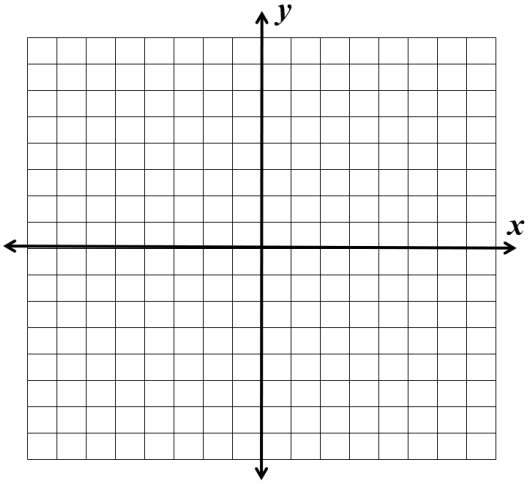
4.2 Parametric Functions Modeling Planar Motion

AP Precalculus Name: _____ **CA #2**

1. An object is moving in the plane so that at any time t, the position of the object at any time t can be found by evaluating the parametric equations $x(t) = t$ and $y(t) = 1 - \frac{1}{2}t^2$.
   a. Without the use of technology, graph the path of the object for $-2 \leq t \leq 3$.



   b. If there were no restrictions on the parameter, what would the position of the object be when $t = 4$?

2. Without the use of technology, determine the horizontal and vertical extrema of the parametric function $f(t) = \left(2t + 1, 1 - \frac{3}{2}t\right)$ for $-4 \leq t \leq 4$.
   a. Find the horizontal relative extrema.

   b. Find the vertical relative extrema.

For each parametric function, find the x- and y-intercepts algebraically.

3. $f(t) = (t - 1, t^2 - 9t + 14)$.
   a. x-intercept(s).

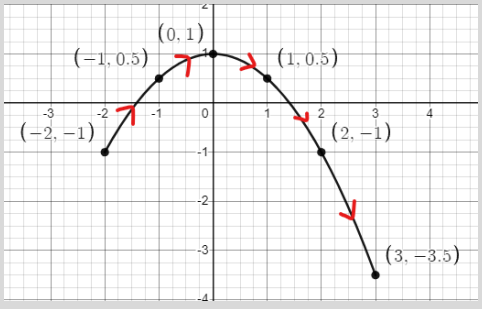
   b. y-intercept(s).

4. $x(t) = t + 2$ and $y(t) = 9 - t^2$ for $-2 \leq t \leq 3$.
   a. x-intercept(s).

   b. y-intercept(s).

5. Without the use of technology, determine the minimum height of an object if the path is modeled by the parametric function $f(t) = (t - 1, |t|)$, for $-5 \leq t \leq 5$.

Answers to 4.2 CA #2

<table>
<tr>
<td>1a.
 
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<td>1b. $(4, -7)$</td>
<td>2.
a. Horizontal Relative Minimum is -7 when $t = -4$
Horizontal Relative Maximum is 9 when $t = 4$

b. Vertical Relative Minimum is -5 when $t = 4$
Vertical Relative Maximum is 7 when $t = -4$</td>
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<tr>
<td colspan="2">3a. $(6,0)$ when $t = 7$ and $(1,0)$ when $t = 2$.
3b. $(0,6)$ when $t = 1$.</td>
<td>4a. $(5,0)$ when $t = 3$.
4b. $(0,5)$ when $t = -2$.</td>
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<td colspan="3">5. Vertical Relative Minimum is 0 when $t = 0$.</td>
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