MTH 264, Quiz #13, Summer 2022 Name KEY

Instructions: Work the problems below as directed. Show all work. Clearly mark your final answers. Use exact values unless the problem specifically directs you to round. Simplify as much as possible. Partial credit is possible, but solutions without work will not receive full credit.

1. Find a parameterization of the line from $(-1,-3)$ to $(6,-16)$. Specify the restriction on the parameter necessary to limit the graph to just the segment of the line between the points. [Hint: there is more than one, but I'll give you bonus points if you can find a parameterization that always stays on the segment between these two points for any value of the parameter.]

$\Delta x = 6-(-1) = 7$

$\Delta y = -16-(-3) = -13$

$x(t) = 7t + -1$

$y(t) = -13t - 3$

$0 \le t \le 1$

or midpt $= (6-1) = 5$ $\quad (5/2, -19/2)$

$-3-16 = -19$

$x(t) = \frac{7}{2}\sin t + 5/2$

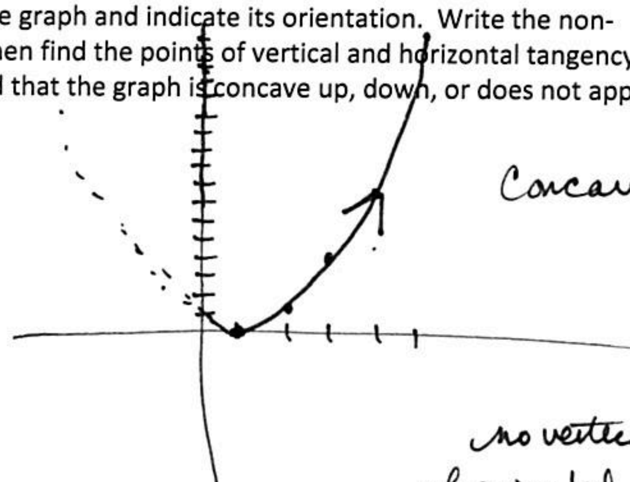
$y(t) = \frac{-13}{2}\sin t - 19/2$

for all $t \in \mathbb{R}$

2. For the parametric curves, sketch the graph and indicate its orientation. Write the non-parametric form of the equation. Then find the points of vertical and horizontal tangency. Verify the results of your sketch, and that the graph is concave up, down, or does not apply.

$x = t+1, y = t^2$

t	x	y
0	1	0
1	2	1
2	3	4
3	4	9
4	5	16



Concave up

no vertical tangents
horizontal tangent when $t=0$

3. Find the slope of the tangent line to the curve $x = e^{-t}, y = e^{2t} - 1$ at the point where $t = 0$.

$\frac{dx}{dt} = -e^{-t}$

$\frac{dy}{dt} = 2e^{2t}$

$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{2e^{2t}}{-e^{-t}} = -2e^{3t}$

$\frac{dy}{dx}[0] = -2$