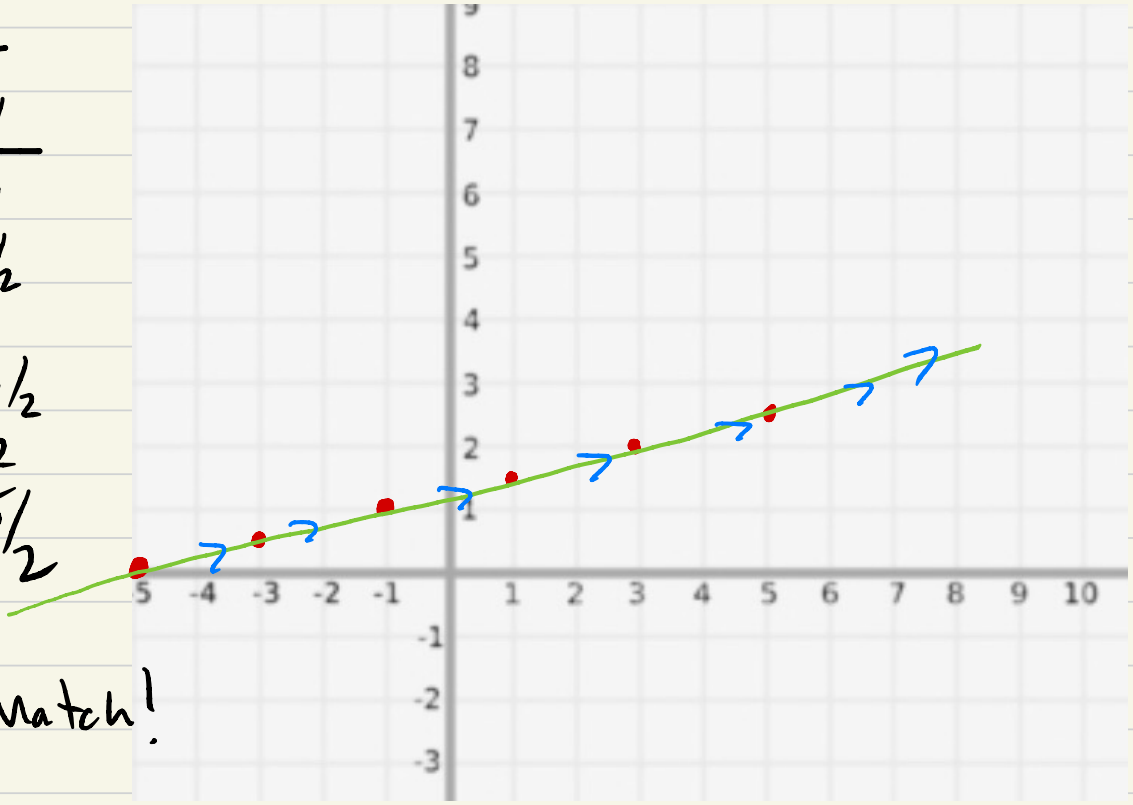
Homework #20

Section 10.1

5. a.

t	x	y
-2	-5	0
-1	-3	1/2
0	-1	1
1	1	3/2
2	3	2
3	5	5/2

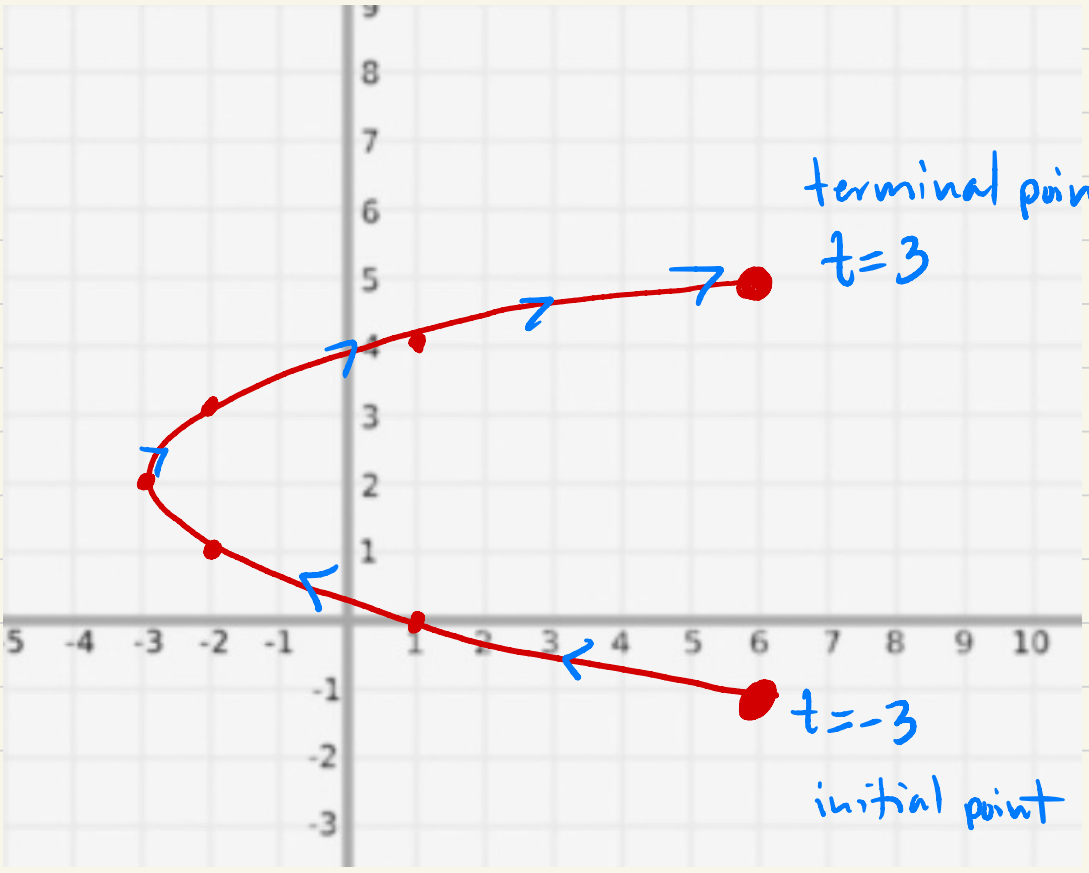


b. $y = \frac{x}{4} + \frac{5}{4}$ Match!

7a.

t	x	y
-3	6	-1
-2	1	0
-1	-2	1
0	-3	2
1	-2	3
2	1	4
3	6	5

Restricted Parameter



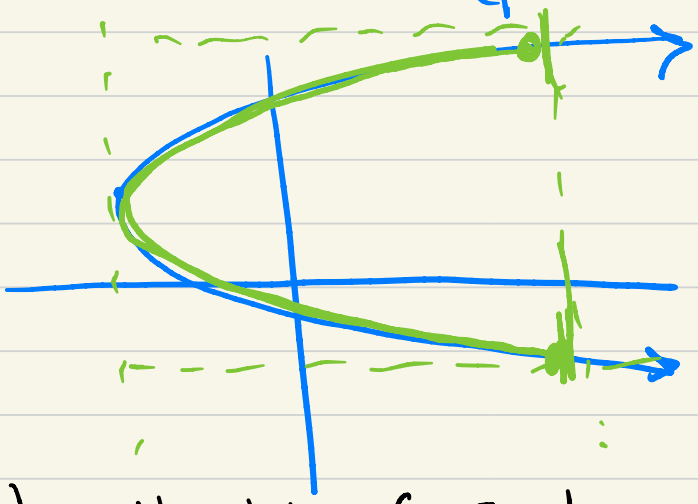
16.1

7b. $x = (y-2)^2 - 3$ with restrictions

$-3 \le x \le 6$ OR $-1 \le y \le 5$

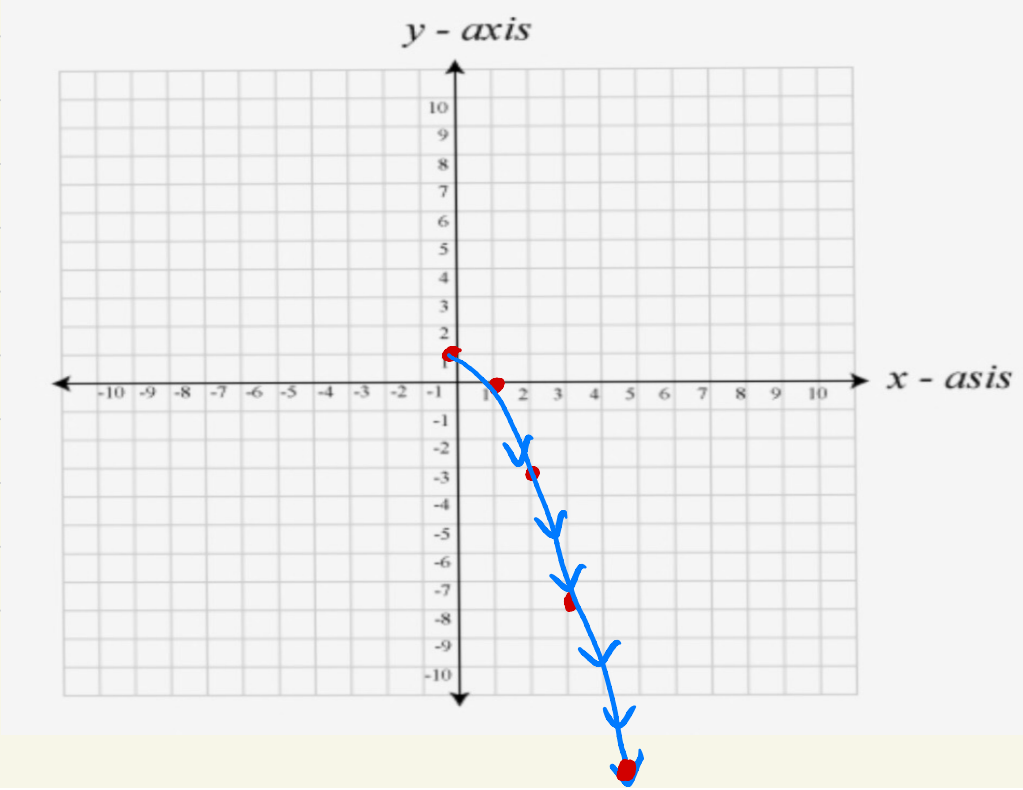
Needed to clarify that the trajectory path is not the entire graph

$x = (y-2)^2 - 3$



9a. Note need $t \ge 0$ Naturally b/c of Root

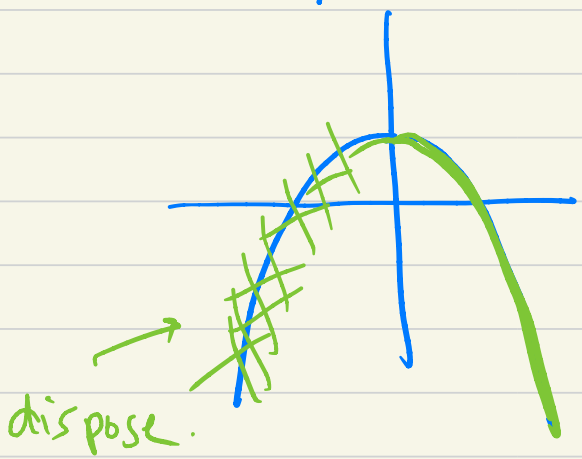
t	x	y
0	0	1
1	1	0
4	2	-3
9	3	-8
16	4	-15
⋮	⋮	⋮



10.1

9b. $y = 1 - x^2$ with $x \geq 0$ (b/c Root ≥ 0)

clarifies not on entire path $y = 1 - x^2$



Section 10.2

5. $$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{t\cos t + \sin t}{-t\sin t + \cos t}$$

$$\left.\frac{dy}{dx}\right|_{t=\pi} = \ldots = \pi$$

Point $= (x(\pi), y(\pi)) = (-\pi, 0)$

$\Rightarrow$

Tangent Line: $y = \pi x + \pi^2$

10.2

42. $\frac{dx}{dt} = e^t - 1 \qquad \frac{dy}{dt} = 2e^{t/2}$ ← check chain rule

$$L = \int_0^2 \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt = \cdots = \boxed{e^2 + 1}$$

45. $\frac{dx}{dt} = -e^t \sin t + e^t \cos t$

$$\frac{dy}{dt} = e^t \cos t + e^t \sin t$$

$$L = \int_0^{\pi} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt = \cdots = \boxed{\sqrt{2}\left[e^{\pi} - 1\right]}$$

Not optional Spring 2021

Section 11.10 ~~BONUS - OPTIONAL~~

62. $\lim_{x \to 0} \dfrac{1 - \cos x}{1 + x - e^x}$ → Power Series??

$$= \lim_{x \to 0} \frac{1 - \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots\right)}{1 + x - \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots\right)}$$

See what Cancels

$$\vdots$$

$$= \boxed{-1}$$