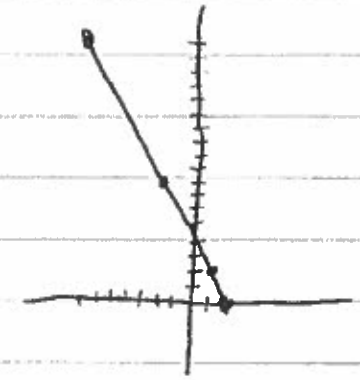
① Plot $x = 2 - t^2$, $y = 2t^2$ for $0 \le t \le 3$,

(Chart of t, x, y values)

t	x	y
0	2	0
1	1	2
2	-2	8
3	-7	18



(By EQ of x & y)

$x = 2 - t^2$

$t^2 = 2 - x$

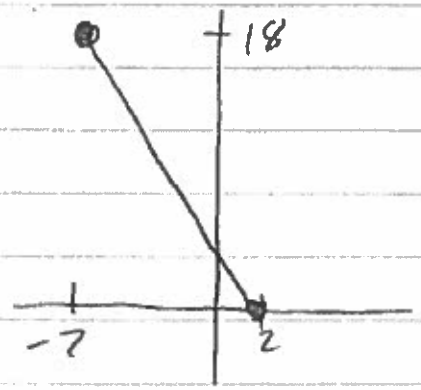
$y = 2t^2$

$y = 2(2 - x)$

$y = 4 - 2x$

from $t = 0 \rightarrow (x, y) = (2, 0)$

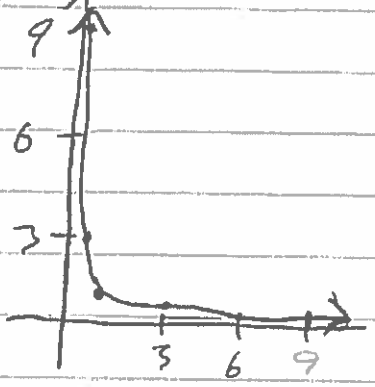
to $t = 3 \rightarrow (x, y) = (-7, 18)$



② Plot $x = 3^t$, $y = 3^{-t}$.

(Chart of t, x, y values)

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



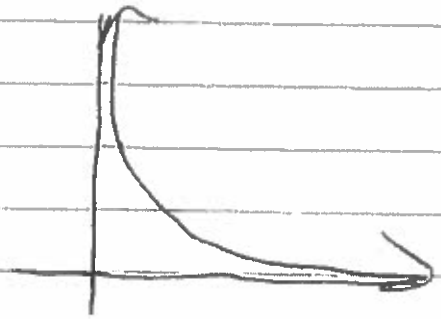
(Eq of x & y)

$x = 3^t$

$y = 3^{-t}$ ($y > 0$)

$y = \frac{1}{3^t}$

$y = 1/x$



(3) Show that $x_0 = t+2$, $y_0 = e^2 e^t$ and $x_1 = \ln t$, $y_1 = t$ share the same para. curve. Then plot it.

$x_0 = t+2$ $\qquad$ $y_0 = e^2 e^t$

$x_0 - 2 = t$ $\qquad$ $y_0 = e^{2+t}$

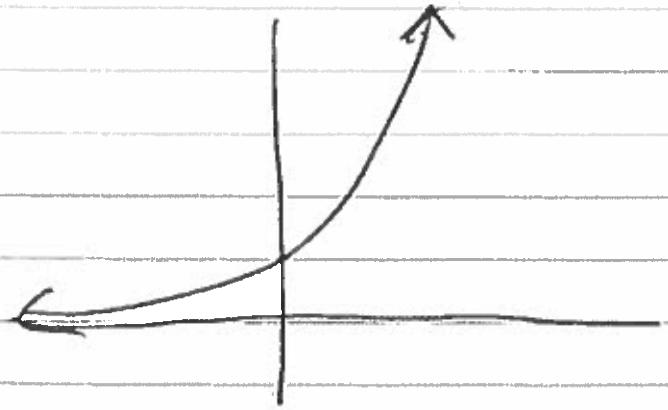
$y_0 = e^{t+x_0-2}$

$y_0 = e^{x_0}$

$x_1 = \ln t$

$e^{x_1} = t$

$e^{x_1} = y_1$



(4) Give a system of para EQs for $y = \cosh x$ from $(-\ln 2, 5/4)$ to $(\ln 2, 5/4)$.

$$x = t \qquad -\ln 2 \le t \le \ln 2$$

$$y = \cosh t$$

(5) Give a system of para EQs for the line segment joining $(0,-4)$ and $(3,5)$.

$$x = x_0 + (x_1 - x_0)t$$
$$= 0 + (3-0)t$$
$$\boxed{x = 3t}$$

$$y = y_0 + (y_1 - y_0)t$$
$$= -4 + (5-(-4))t$$
$$\boxed{y = -4 + 9t}$$

(Always for this formula)

$$\boxed{0 \le t \le 1}$$

(6) Give a system of para EQs for the line segment joining $(1,2)$ and $(-3,3)$.

$$x = x_0 + (x_1 - x_0)t$$
$$= 1 + (-3-1)t$$
$$\boxed{x = 1 - 4t}$$

$$y = y_0 + (y_1 - y_0)t$$
$$= 2 + (3-2)t$$
$$\boxed{y = 2 + t}$$

$$\boxed{0 \le t \le 1}$$

(7) Give two different systems of para EQs for the line segment $y = 4 - 3x$ between $x = -2$ and $x = 3$.

$$x = t \qquad -2 \le t \le 3$$
$$y = 4 - 3t$$

AND

$(x_0, y_0) = (-2, 4-3(-2)) = (-2, 10)$ $\qquad$ $(x_1, y_1) = (3, 4-3(3)) = (3, -5)$

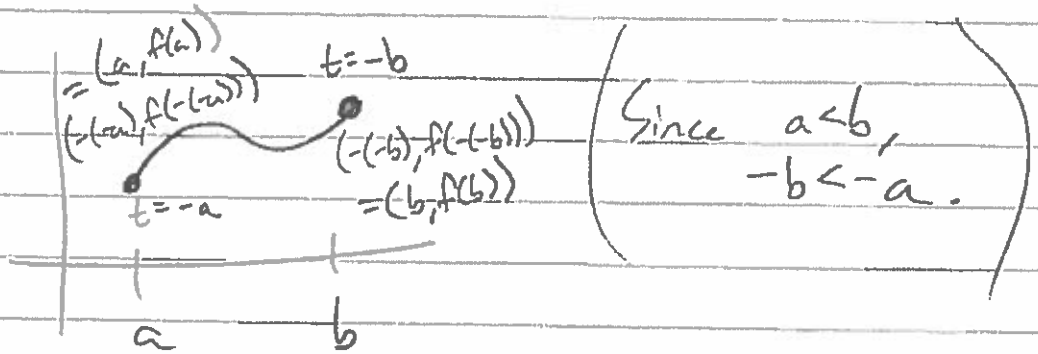
$x = x_0 + (x_1 - x_0)t = -2 + (3 - -2)t$

$x = -2 + 5t$

$y = y_0 + (y_1 - y_0)t = 10 + (-5 - 10)t$

$y = 10 - 15t$

(8) Let $a<b$. Find a system of para EQs for the planar curve $y=f(x)$ right-to-left from $(b, f(b))$ to $(a, f(a))$.



Since $a<b$, $-b<-a$.

Let $x=-t$, $y=f(-t)$ for $-b \le t \le a$

(9) Give a sys. of para. EQs for $x^2+(y+1)^2=9$ c.c.w.

$$(x-0)^2+(y-(-1))^2=(3)^2$$

center $=(0,-1)$ radius $=3$

$x = x_0 + r\cos\theta$

$\boxed{x = 0 + 3\cos\theta}$

$y = y_0 + r\sin\theta$

$\boxed{y = -1 + 3\sin\theta}$

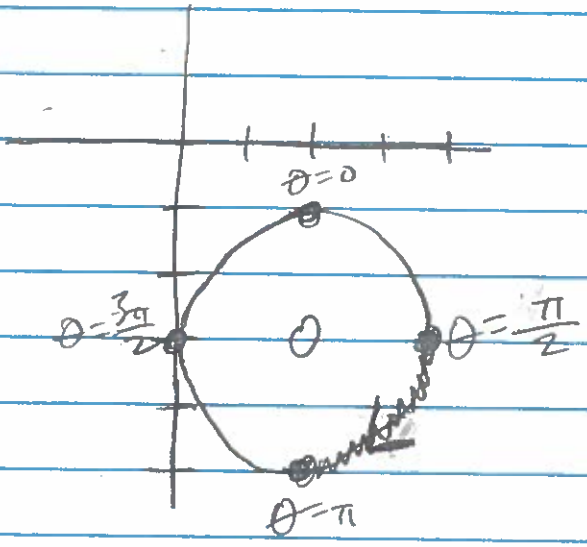
$\boxed{0 \le \theta \le 2\pi}$

(Check)

$$x^2+(y+1)^2 = (0+3\cos\theta)^2+(-1+3\sin\theta+1)^2$$
$$= 9\cos^2\theta + 9\sin^2\theta$$
$$= 9(\cos^2\theta+\sin^2\theta)$$
$$= 9 \quad \checkmark$$

(10) Give sys. of EQs parameterizing the circle arc $(x-2)^2+(y+3)^2=4$ clockwise from $(4,-3)$ to $(2,-5)$

center $=(2,-3)$ radius $=2$



$x = x_0 + r\sin\theta$

$\boxed{x = 2 + 2\sin\theta}$

$\boxed{\frac{\pi}{2} \le \theta \le \pi}$

$y = y_0 + r\cos\theta$

$\boxed{y = -3 + 2\cos\theta}$

(Check) At $\theta=\pi$

$x = 2 + 2\sin\pi$
$= 2$

$y = -3 + 2\cos\pi$
$= -3 - 2 = -5$

$(2,-5)$ ✓

EQ

$(x-2)^2+(y+3)^2$ At $\theta=\frac{\pi}{2}$

$=(2\sin\theta)^2+(2\cos\theta)^2$

$= 4\sin^2\theta + 4\cos^2\theta$

$= 4$ ✓

$x = 2 + 2\sin\frac{\pi}{2}$
$= 2 + 2 = 4$

$y = -3 + 2\cos\frac{\pi}{2}$
$= -3$

$(4,-3)$ ✓