#15 $h(t) = 6 + 95t - 16t^2$

$h(t)$: height in feet; t: time in seconds

a) When will the object hit the ground?

Let $0 = 6 + 95t - 16t^2$

Now solve By Graphing; factoring or Quad Method.

$X_{min} = -10$

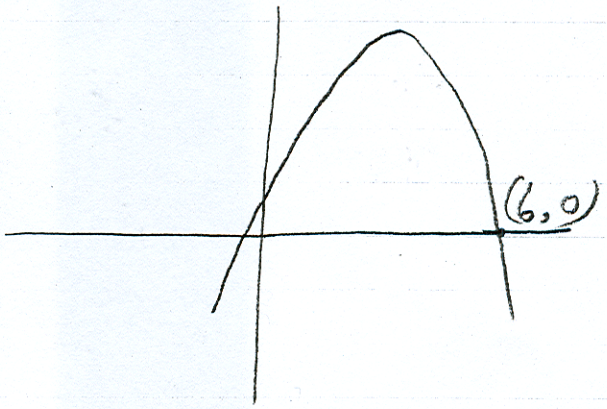
$X_{max} = 10$

$X_{scl} = 1$

$Y_{min} = -20$

$Y_{max} = 200$

$Y_{scl} = 1$



So, after 6 seconds the object will hit the ground.

b) When will it reach its Max height?

We are looking for t value of Vertex

$$t = \frac{-b}{2a} = \frac{-95}{2(-16)} = 2.97 \text{ seconds}$$

c) Max height is $h(2.97) = 147.02$ feet

#16] $f(x) = -\dfrac{\sqrt{x+3}}{1-x^2}$

$f(-4) = -\dfrac{\sqrt{-4+3}}{1-(-4)^2} = -\dfrac{\sqrt{-1}}{1-16} \Rightarrow$ No Real Answer

$f(-3) = -\dfrac{\sqrt{-3+3}}{1-(-3)^2} = 0$

$f(0) = -\dfrac{\sqrt{0+3}}{1-0^2} = -\dfrac{\sqrt{3}}{1} = -\sqrt{3} \cong -1.732$

$f(1) = -\dfrac{\sqrt{1+3}}{1-1^2} = \dfrac{-2}{0}$ = undefined Because we cannot divide by Zero.

$f(2) = -\dfrac{\sqrt{2+3}}{1-4} = \dfrac{-\sqrt{5}}{-3} = \dfrac{\sqrt{5}}{3} \approx 0.745$

$f(6) = -\dfrac{\sqrt{6+3}}{1-6^2} = \dfrac{-\sqrt{9}}{1-36} = \dfrac{-\sqrt{9}}{-35} = \dfrac{\sqrt{9}}{35} = \dfrac{3}{35}$

#17] What is the Domain of $f(x) = \dfrac{2x-3}{4x+5}$?

Answer: Domain is all reals except $\dfrac{-5}{4}$

$4x+5=0$
$-5\ \ -5$
$4x = -5$
$x = -5/4$

#18 a) After 5 hours, there were 3000 Bacteria in the dish.

b) After 10 hours the number of bacteria is levelling off at 6000; because the are running out of space / food.

#19 $\text{Log}(1) = 0$; $\ln(e^5) = 5 \ln e = 5$

$\ln(5)$ = use calculator $= 1.6094$

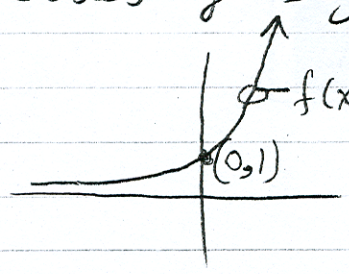
$\log_2 16 = 4$ Because $2^4 = 16$

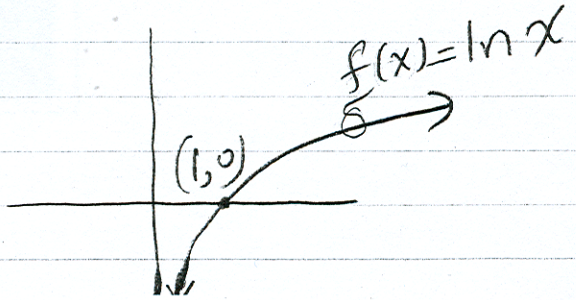
OR

$$\log_2 16 = \frac{\log 16}{\log 2} = 4$$

#20 Part C of Problem 17 is difficult to do Because the others can be done using the properties of Logarithmics

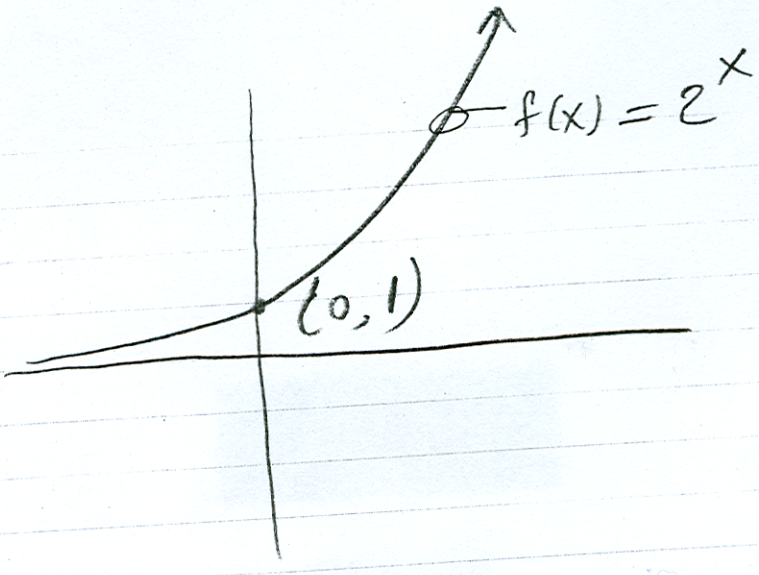
#21



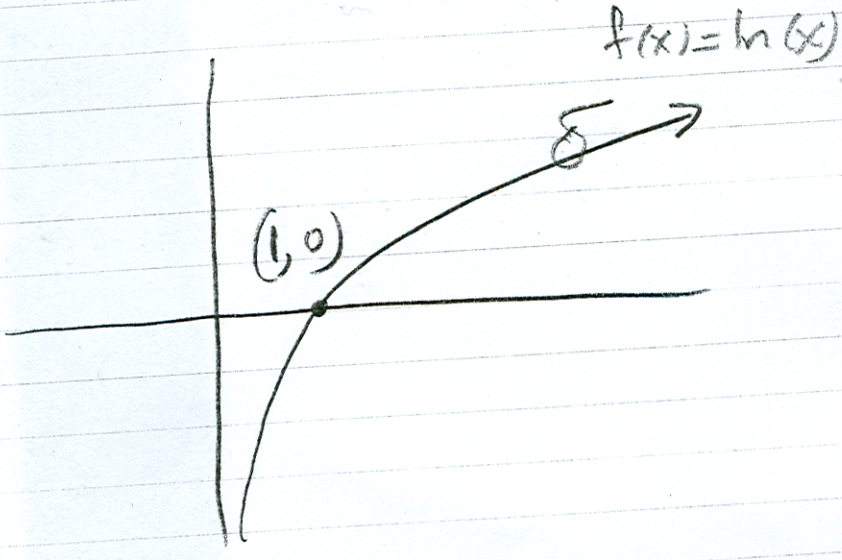


#21)

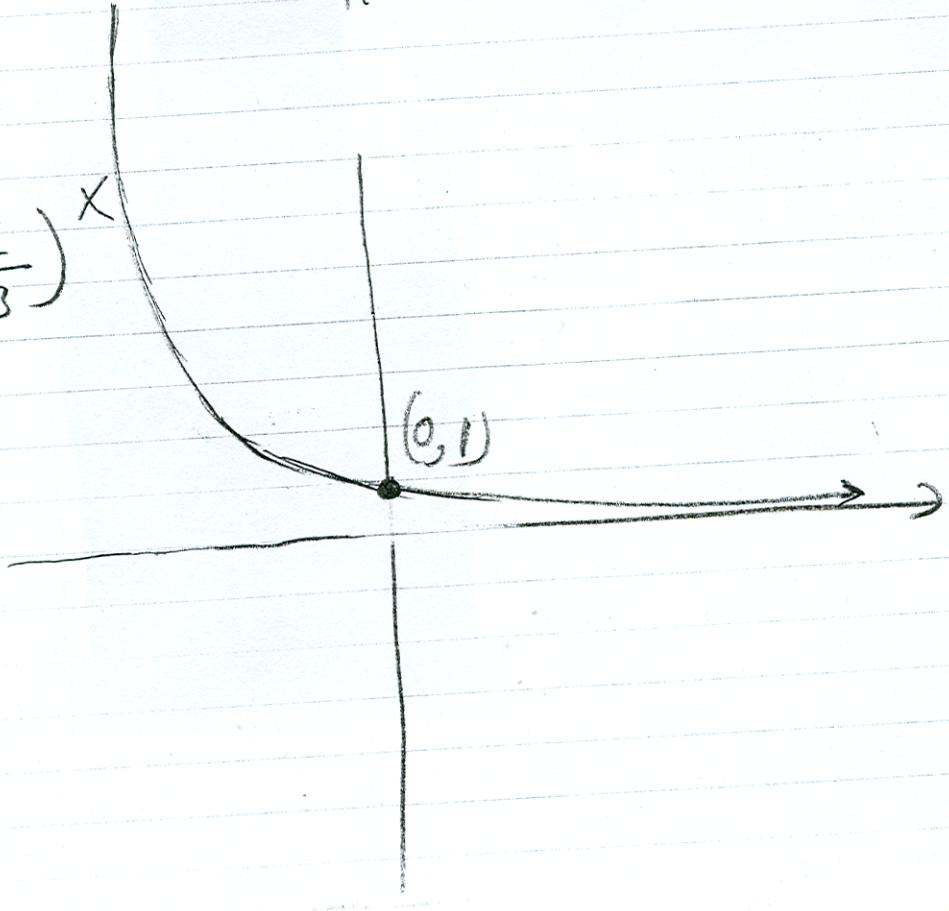
a)



b) $f(x) = \ln(x)$



c) $f(x) = \left(\frac{2}{3}\right)^x$



#22 a) $f(3)=0$ in functions III & IV

b) $f(0)=3$ in functions II & IV

c) Zeros of function III $x=-6,\ x=-1,\ x=3$

d) pick points $(-5,0)$ & $(0,2)$

$$\text{slope} = \frac{2-0}{0-(-5)} = \frac{2}{5}$$

So, the eqn is: $\boxed{y=\frac{2}{5}x+2}$

#23 $f(t) = 100(1+0.04)^t = 100(1.04)^t$

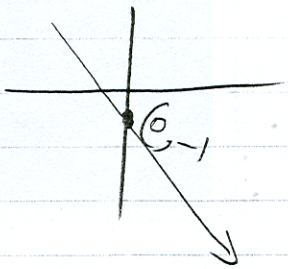
a) $f(5) = 100(1.04)^5 = \$121.67$

b) $1000 = 100(1.04)^t$

$$10 = 1.04^t \Rightarrow t = \log_{1.04} 10 = \frac{\log 10}{\log 1.04} = 58.7 \text{ years}$$

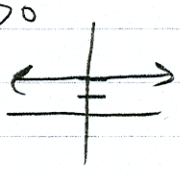
#24 a) $m>0$ and $b<0$ $y=3x-1$

b) $m<0$ and $b<0$ $y=-3x-1$



c) $m=0$ $b>0$

$y=2$



#25 (a)

$$\begin{matrix} 3 \\ 4 \end{matrix}\begin{cases} 3s - 4t = 8 \\ 2s + 3t = -6 \end{cases}$$

Add
$$\begin{cases} 9s - 12t = 24 \\ 8s + 12t = -24 \end{cases}$$

$$17s = 0 \Rightarrow s = 0$$

$$3(0) - 4t = 8 \rightarrow -4t = 8 \Rightarrow \boxed{t = -2}$$

Thus, the solution is $(0, -2)$

#25 b) $\begin{cases} x^2+y^2=26 \\ x^2-2y=23 \end{cases} \Rightarrow$ $x^2+y^2=26$

$-x^2+2y=-23$

ADD

$y^2+2y=3$

$y^2+2y-3=0$

Now factor & solve $(y+3)(y-1)=0$

$\boxed{y=-3}$ $\boxed{y=1}$

If $y=-3 \Rightarrow x^2-2y=23 \Rightarrow x^2-2(-3)=23 \Rightarrow x^2=23-6=17$

So, $x=\pm\sqrt{17}$

i.e $\boxed{(\sqrt{17},-3)}$ $\boxed{(-\sqrt{17},-3)}$

If $y=1 \Rightarrow x^2-2(y)=23$

$x^2-2(1)=23$

$x^2=23+2=25$

$x=\pm 5$

$\boxed{(5,1)}$ $\boxed{(-5,1)}$

Answers

#26) $3.5^{x} = 10$

$5^{x} = \frac{10}{3}$

$\log 5^{x} = \log\left(\frac{10}{3}\right)$

$x \log 5 = \log\left(\frac{10}{3}\right)$

$x = \frac{\log\left(\frac{10}{3}\right)}{\log 5} = 0.7481$

#27) stat Edit and input the data in your Calc.

L_1	L_2
0	400
1	366
2	339
3	307
4	275
5	244

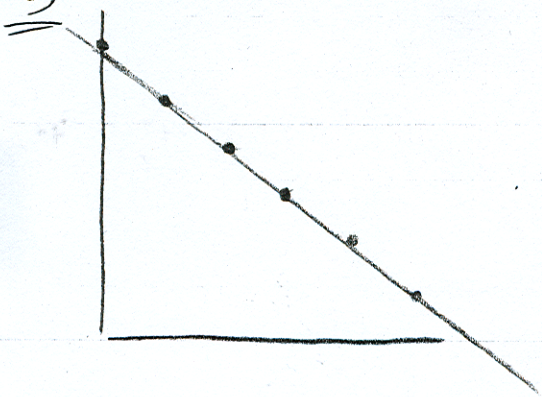
a) 2nd STAT PLOT

Plot 1 --- On

Type [⋱]

GRAPH ZOOM 9 ENTER

b)

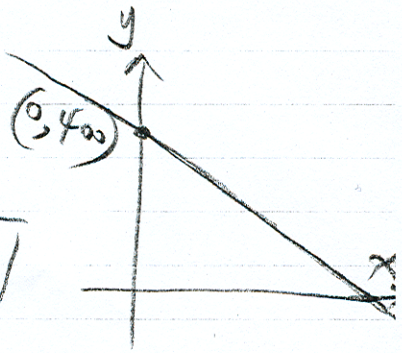


c) To find the equation of the line

use (0, 400) and (5, 244)

$$m = \frac{244 - 400}{5 - 0} = -31.2$$

$y = mx + b \Rightarrow$ **$y = -31.2x + 400$**



d) $f(10) = -31.2(10) + 400 = 88$

e) What is x intercept $0 = -31.2x + 400$

$x = 12.821$

$(12.821, 0)$

After about 13 years the net worth of this retired man will be zero, i.e. he will run out of $.

f) y intercept is $(0, 400)$ this means that this retired man started with a net worth of $400 000 when he retired

g) slope $= -31.25$ His Net worth decreased by $31 250 per year

#28)

a) $\begin{cases} 3x-5y=8 \\ 4x+2y=9 \end{cases}$ $\Longrightarrow y_1 = \dfrac{8-3x}{-5}$ $\Longrightarrow y_2 = \dfrac{9-4x}{2}$

$(2.346, -0.19)$

b) $\begin{cases} y = 3x^2-5x+2 \\ 2(y+x^2) = 4x+9 \end{cases}$ $\Longrightarrow y_1 = 3x^2-5x+2$

$y + x^2 = 2x + \frac{9}{2}$

$y = -x^2+2x+\frac{9}{2}$ $\Longrightarrow y_2 = -x^2+2x+\frac{9}{2}$

$(-0.304, 3.799)$

$(2.054, 4.389)$