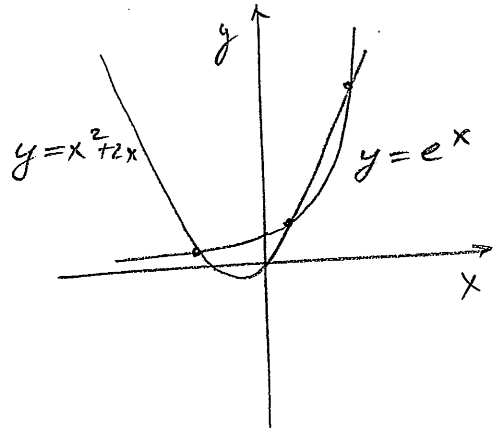
#18

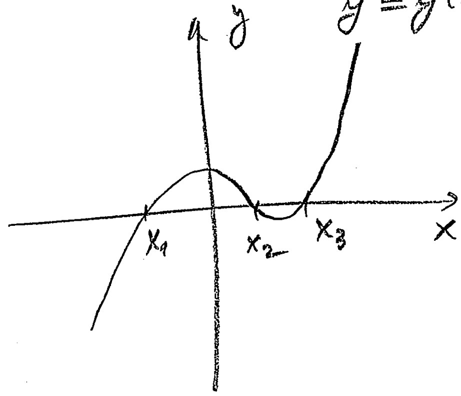


Solve $e^x = x^2+2x$ graphically.

Geometrically, there are 3 intersection pts. between the graphs $\Rightarrow$ 3 solutions.

In a graphing calculator, graph $y = e^x - x^2 - 2x = g(x)$ and see where the graph crosses the x-axis.

Use $\boxed{\text{TRACE}}$ and $\boxed{\text{ZOOM}}$ to zoom in and trace the values on the graph.



More accurately, find roots with $\boxed{\text{calc}} \to \boxed{\text{zero}}$

$x_1 = -2.061714$
$x_2 = 0.7894889$
$x_3 = 2.2742775$

#32. $A_n(t) = P\left(1+\frac{r}{n}\right)^{nt}$; $P = 1{,}000$ [dollars], $r = 0.05$ [1/year], $t = 1$ [year]

(a) $A_1 = 1{,}050$
$A_2 = 1{,}050.625$
$A_4 = 1{,}050.945$

(b) $A_n(1) = P\left(1+\frac{r}{n}\right)^n$

(c)

n	1,000	10,000	100,000	...	∞
$A_n(1)$	1,051.27	1,051.27	1,051.27	...	$Pe^r = 1{,}051.271$

#40.

$P(t) = P_0\, b^{t}$ (exponential growth; base b TBD.)

$t_D = 9.3$ [hours.]

$P(9.3) = P_0 \cdot b^{9.3} = P_0 \cdot 2$

$b^{9.3} = 2$

$b = 2^{1/9.3}$

$P(0) = 20$ (initial population)

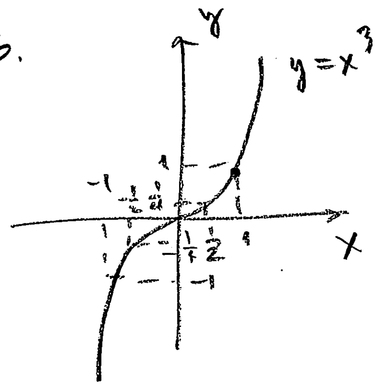
$P(t) = 20\,(2^{1/9.3})^{t} = 20\; 2^{t/9.3}$

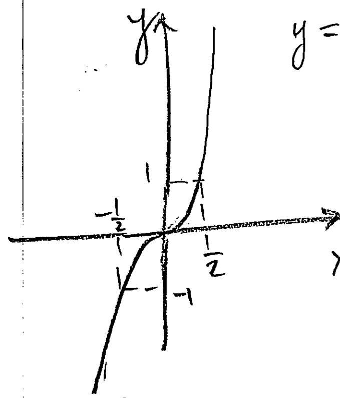
$P(3\text{days}) = P(72) = 20 \cdot 2^{72/9.3}$

$= 4{,}281.39$

$\approx 4{,}281$ bacteria.

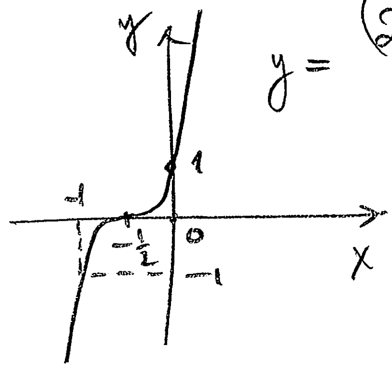
16.





$y = \frac{(2x)^3}{2} = 4x^3$

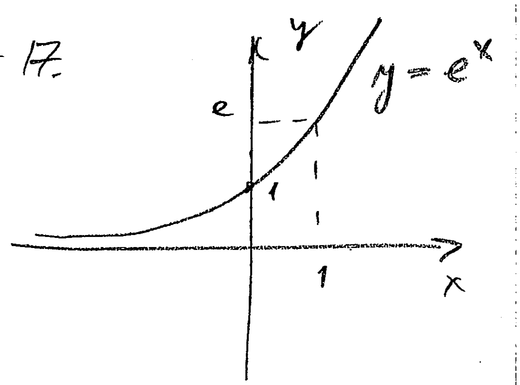
(vertical stretching)

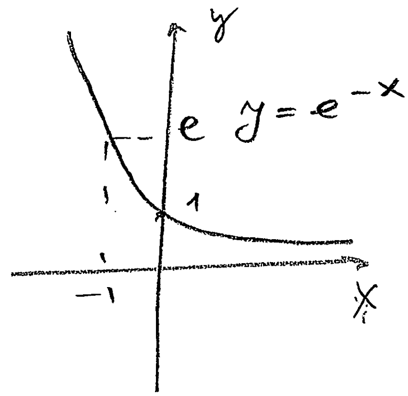


$y = \frac{\left(2\left(x+\frac{1}{2}\right)\right)^3}{2} = \frac{(2x+1)^3}{2}$

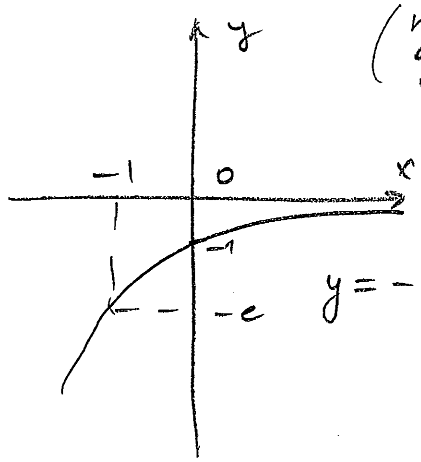
(horizontal shift left by $\frac{1}{2}$)

17.

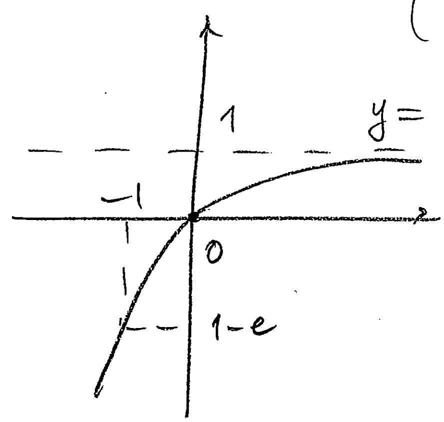




(reflection about the y-axis)

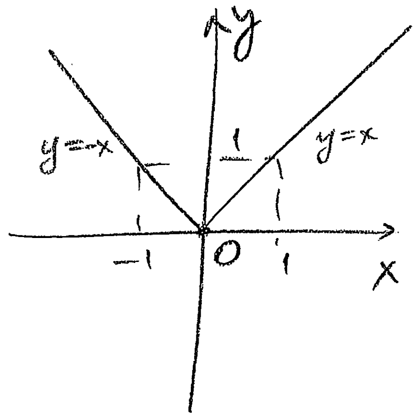


(refl. about the x-axis)

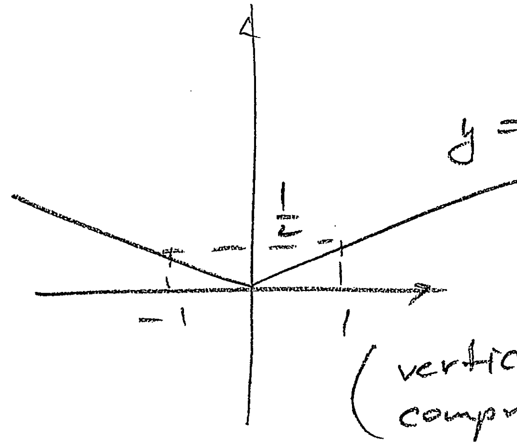


(vertical shift by +1)

#18.

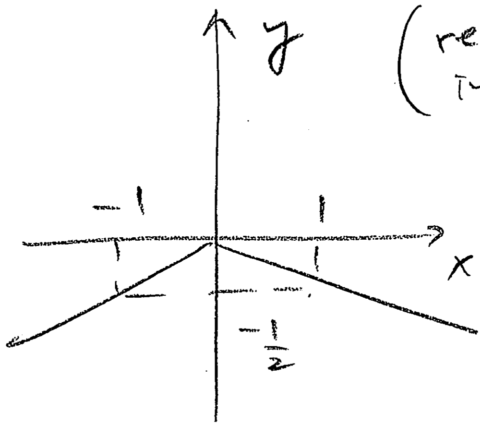


$y = |x|$



$y = \frac{|x|}{2}$

(vertical compression)



(reflection in the x-axis)

$y = -\frac{|x|}{2}$

MATH 255A HOMEWORK PROBLEMS – SECTION 1.6

#10. $y = e^{2x+1}$; domain $\mathbb{R}$; range $(0,\infty)$

domain of inverse: $(0,\infty)$

range of inverse: $\mathbb{R}$.

Solve for x:

$$e^{2x+1} = y$$

$$2x+1 = \ln(y)$$

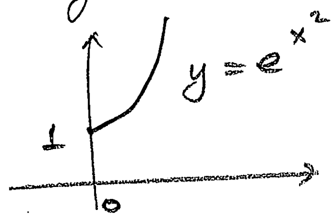
$$2x = \ln(y) - 1$$

$$x = \frac{\ln(y)-1}{2}$$

$$y = \frac{\ln(x)-1}{2}$$ – inverse function

#12. $y = e^{x^2}$, x in $[0,\infty)$

range: $[1,\infty)$.



domain of inverse: $[1,\infty)$

range of inverse: $[0,\infty)$.

Solve for x:

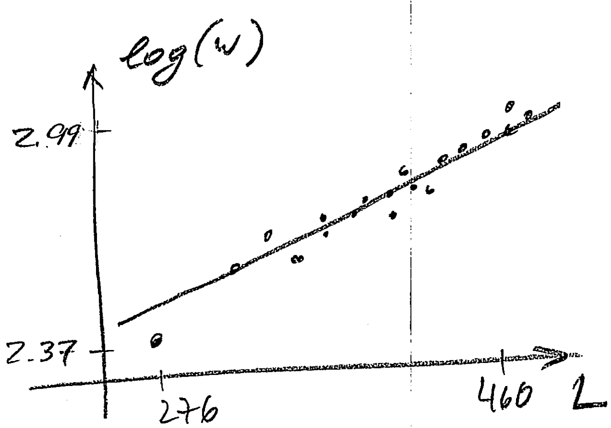
$$e^{x^2} = y$$

$$x^2 = \ln(y)$$

$$x = +\sqrt{\ln(y)}$$ since x in $[0,\infty)$

$$y = \sqrt{\ln(y)}$$ – inverse function.

 # 45



$$y = ax + b$$

$$a = 0.002956$$

$$b = 1.63139$$

$$W = 10^{ax+b}$$

$$= 42.8 \cdot 10^{0.002956L}$$