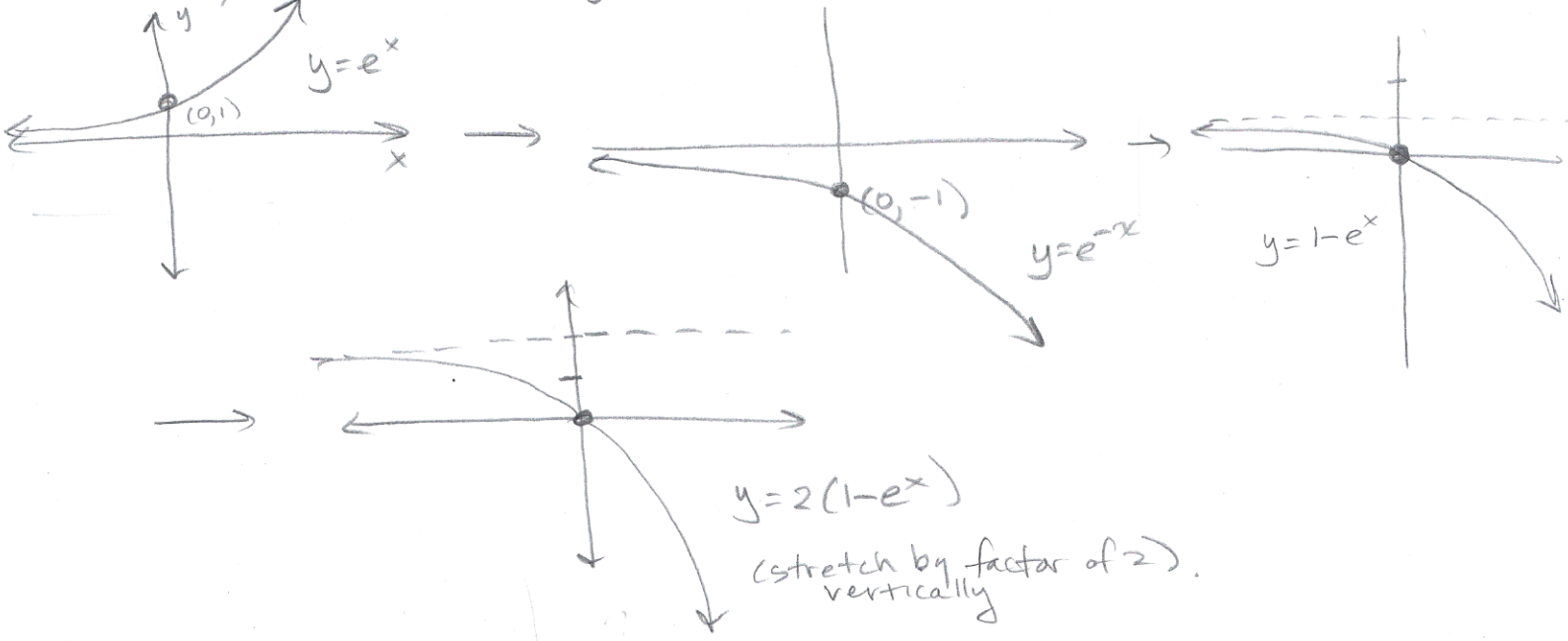
1.5.2 (a) How is the number e defined?

e is the base that gives exponential function a^x a slope of 1 at the point $(0,1)$.

(b) $e \approx 2.712$

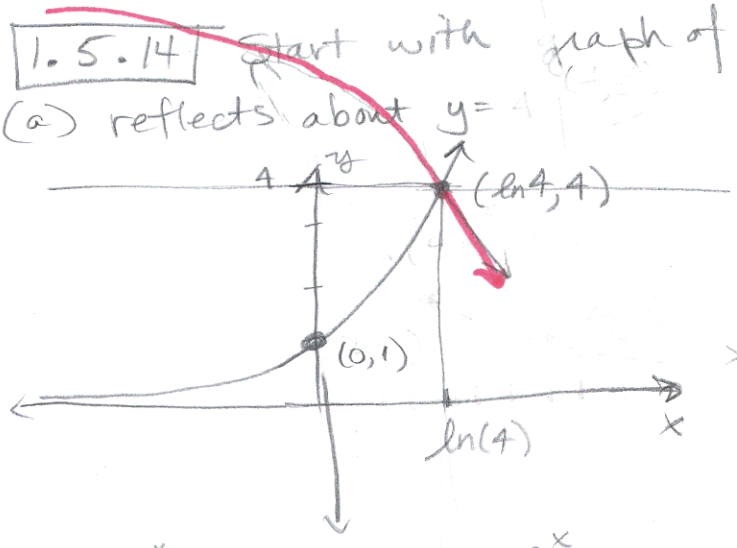
(c) The natural exponential function is $y = e^x$.

1.5.12 Rough sketch of $y = 2(1-e^x)$.



1.5.14 Start with graph of $y = e^x$. Write equation that

(a) reflects about $y=$

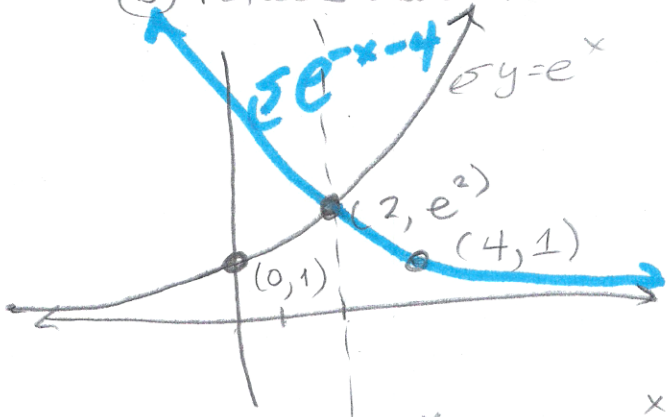


START w/ e^x.
SHIFT 4 UNITS DOWN
REFLECT OVER X-AXIS
SHIFT 4 UNITS UP

$y = e^x$
$y = e^x - 4$
$y = -(e^x - 4)$
$y = -(e^x-4)+4 = -e^x + 8$

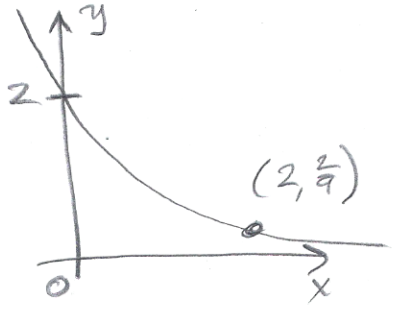
ANS: $y = -e^x + 8$

(b) reflects about $x = 2$.



+START w/ e^x : $y = e^x$
+ SHIFT 2 UNITS LEFT
$y = e^{x+2}$
+REFLECT OVER y-AXIS
$y = e^{-(x+2)}$
+ SHIFT 2 UNITS RIGHT
$y = e^{-(x+2)} - 2$

1.5.18 FIND FUNCTION OF FORM $y = Ca^x$



$(0,2)$: $2 = Ca^0$ So $C = 2$.

$(2, \frac{2}{9})$: $\frac{2}{9} = 2a^2$

SOLVE FOR a

$\frac{1}{9} = a^2$

$\pm\frac{1}{3} = a$. NEGATIVE SOLUTION MAKES NO SENSE HERE, So $a = \frac{1}{3}$

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

1.5.19 If $f(x) = 5^x$, find difference quotient $\frac{f(x+h)-f(x)}{h}$

$$\frac{f(x+h)-f(x)}{h} = \frac{5^{x+h}-5^x}{h} = \frac{5^x[5^h-1]}{h}$$

1.5.20 The second method pays 2^{n-1} cents on the n^{th} day. So after 30 days we would have

$1 + 2 + 2^2 + \cdots + 2^{29}$ cents.

How much is this?

If $S = 1 + 2 + 2^2 + \cdots + 2^{29}$ (2)

$2S = 2 + 2^2 + \cdots + 2^{29} + 2^{30}$ (1)

(1)-(2) $S = 2^{30} - 1$

WHICH IS OVER A BILLION PENNIES, HENCE A FACTOR OF 10 LARGER THAN A MILLION DOLLARS. USE THE SECOND METHOD