Online Assignment:

Due today at 3 pm. Just the first 18 questions. There is an additional 3 questions but you do not have to do them.

There is an additional (optional) assignment due Tuesday at 3 pm if you have been trouble with the website. This assignment can only be submitted ONCE.

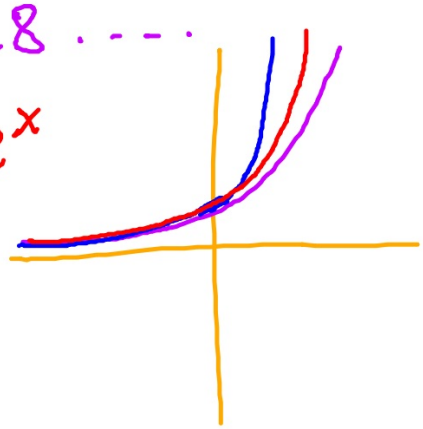
4.3: Graphing another exponential function (e)

The natural base: e "euler's number"

e: irrational

$e \approx 2.71828\ldots$

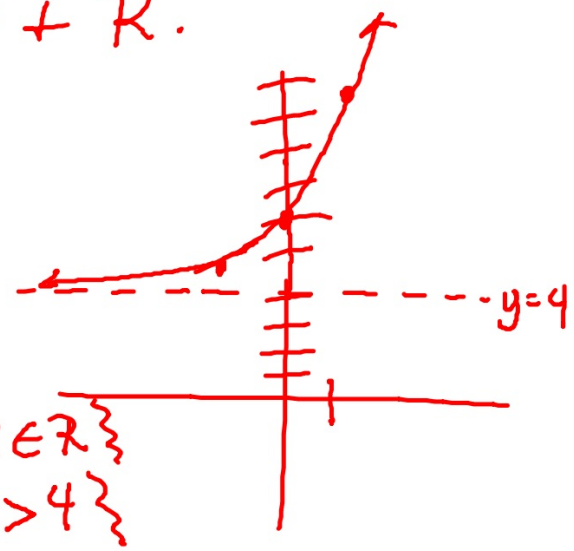
$y = 2^x$ $y = 3^x$ $y = e^x$



① Sketch. State D + R.

$y = 2e^x + 4$

x	y
0	6
1	9.4
−1	4.7



D: $\{x \mid x \in \mathbb{R}\}$

R: $\{y \mid y > 4\}$

growth: $e > 1$

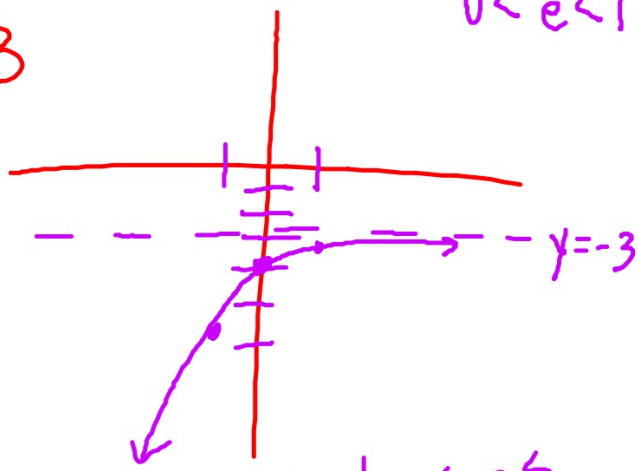
② Sketch: Find D + R.

$y = -e^{-x} - 3$

$y = -\left(\frac{1}{e}\right)^{x} - 3$

x	y
0	-4
-1	-5.7
1	-3.4

decay $0 < \frac{1}{e} < 1$



D: $\{x \mid x \in R\}$

R: $\{y \mid y < -3\}$

Simplify. Leave your answer in terms of e.

③ $e^2 \cdot e^5 = e^7$

④ $\frac{12e^4}{3e^8} = \frac{4}{e^4}$

⑤ $(5e^{-3})^2 = 5^2 e^{-6} = \frac{25}{e^6}$

⑥ $\sqrt{8e^6x^8y^{18}z} = 2e^3x^4|y^9|\sqrt{2z}$

Interest

Compound Interest: Interest that is compounded "n" times per year.

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

A	accumulated amount of money
P	Prinicipal amount (initial)
r	rate of interest (decimal)
n	number of times the interest is compounded per year
t	time in years

Word	n
yearly	1
monthly	12
weekly	52
daily	365
semiannually	2
bimonthly	6
biweekly	26

semi: twice per

bi: every other

7) $4,000 is invested at 3.7% compounded monthly. How much will be in the account after 5 years?

$P = \$4000$

$r = .037$

$n = 12$

$t = 5$

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

$$A = 4000\left(1 + \frac{.037}{12}\right)^{12 \cdot 5}$$

$$= \$4811.50$$

A

8) How much interest was earned in the last example?

$$\begin{array}{r} \$4811.50 \\ -\ \$4000.00 \\ \hline \$811.50 \end{array}$$

Compounded continuously $y = Pe^{rt}$

9) If you invest $50,000 compounded continuously at 12% for 30 years, how much money will you earn?

$P = \$50,000$

$r = .12$

$t = 30$ years

$y = 50,000e^{.12 \times 30}$

$y = \$1,829,911.72$

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compounded monthly

$y = 50000\left(1 + \frac{.12}{12}\right)^{12 \times 30}$

$= \$1,797,482.07$

10) You invested money 10 years ago at 2% compounded continuously. If the account is now worth $5,410, how much was initially invested?

$A = \$5410$

$r = .02$

$t = 10$

$A = Pe^{rt}$

$\frac{5410}{e^{.02\times 10}} = \frac{Pe^{.02\times 10}}{e^{.02\times 10}}$

$\$4429.33 = P$