cp calc block 11
hw odds p55, 59-101



Ch1.6 (II)
Exponential and Logarithmic Functions



Objective D
**How to develop and use properties of the natural logarithmic function**



Exercises #1: Evaluate without a calculator

$\log_5 \sqrt[3]{25} = \frac{2}{3}$



Exercises #2: Evaluate without a calculator

$\log \sqrt[3]{10} = \frac{1}{3}$



Exercises #3: Evaluate without a calculator

$\ln e^3 = 3$



Exercises #4: Evaluate without a calculator

$\log 10,000 = 4$



Exercises #5: Evaluate without a calculator

$\ln 1 = 0$



Exercises #6: Evaluate without a calculator

$7^{\log_7 3} = 3$

*Exercises #7:* Evaluate without a calculator

$$e^{\ln 6} = 6$$

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*Exercises #8:* Evaluate without a calculator

$$10^{\log 14} = 14$$

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*Exercises #9:* Solve

$$\log x = 2$$

$$x = 100$$

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*Exercises #10:* Solve

$$\log x = -1$$

$$x = 0.1$$

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*Exercises #11:* Solve

$$\ln x = 5$$

$$e^5 \approx 148.4132$$

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*Exercises #12:* Solve

$$\ln x = -2$$

$$e^{-2} \approx 0.1353$$

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*Exercises #13:* Solve by a calculator

$$10^x = 3$$

$$\log 3 \approx 0.4771$$

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*Exercises #14:* Solve by a calculator

$$e^x = 7.3$$

$$\ln 7.3 \approx 1.9879$$

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*Exercises #15:* Solve the equation

$$\ln x = 2.8$$

$$e^{2.8} \approx 16.4446$$

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*Exercises #16:* Solve the equation

$$\ln x = 3.1$$

$$e^{3.1} \approx 22.1980$$

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***product rule***

***quotient rule***

***power rule***

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$$\log M \times N = \log M + \log N$$

$$\log \frac{M}{N} = \log M - \log N$$

$$\log M^k = k \log M$$

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*Change-of-base formula:*

$$\log_M N = \frac{\log N}{\log M}$$

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*Exercises 17:* Write using only natural log

$$\log_3 x = \frac{\ln x}{\ln 3}$$

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*Exercises 18:* Expand

$$\ln x(x-2)^3$$

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*Exercises 19:* Write as a single quantity

$$\frac{3}{2}\{\ln(x^2+1) - \ln(x+1) - \ln(x-1)\}$$

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*Exercises 20:* solve for x

$$e^{\ln 2x} = 3$$

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*Exercises 21:* solve for x

$$\ln x^2 = 8$$

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*Exercises 22:* solve for x

$$e^{-3x} = 7$$



*Exercises 23:* solve for x

$$e^{1-x} < 6$$



*Exercises 24:* solve for x

$$1 < \ln x < 100$$



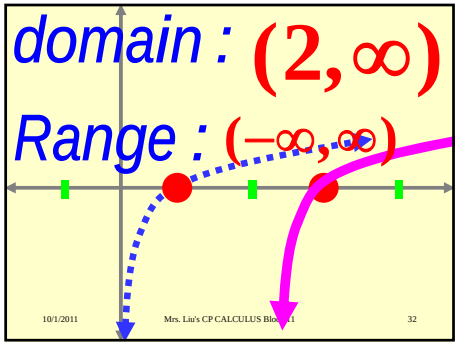
*Exercises #25:* Sketch the function and state the domain and range.

$f(x) = \log_7(x - 2)$



domain : $(2, \infty)$

Range : $(-\infty, \infty)$





*Exercises #26:* Sketch the function and state the domain and range.

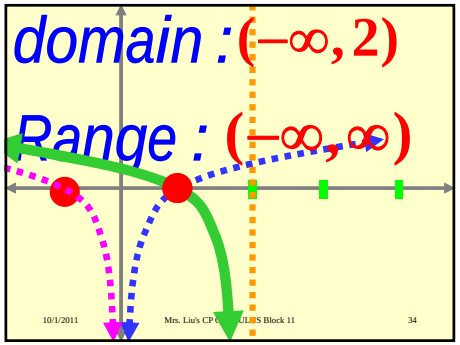
$f(x) = \log_2(2 - x)$

$f(x) = \log_2[-(x - 2)]$



domain : $(-\infty, 2)$

Range : $(-\infty, \infty)$

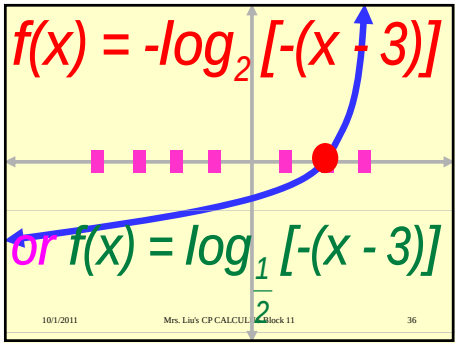




*Exercises #27:* Write a logarithmic function with a base 2 for the graph provided



$f(x) = -\log_2[-(x - 3)]$



or $f(x) = \log_{\frac{1}{2}}[-(x - 3)]$

*Exercises 28:* Write as a sum or difference of logs

$3\ln 2 + \ln x$

$\ln 8x$

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*Exercises 29:* Write as a sum or difference of logs

$\log \frac{3}{x} =$

$\log 3 - \log x$

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*Exercises #30:* Write as a sum or difference of logs

$\log_2 x^{-2} =$

$-2\log_2 x$

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*Exercises 31:* Write as a sum or difference of logs

$\ln \frac{x^2}{y^3}$

$2\ln x - 3\ln y$

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*Exercises 32* Write as a sum or difference of logs

$\ln \frac{\sqrt[3]{x}}{\sqrt[3]{y}} =$

$\frac{1}{3}\ln x - \frac{1}{3}\ln y$

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*Exercises 33:* Write as a single log

$\log xy$

$\log x + \log y$

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*Exercises 34:* Write as a single log

$\ln \frac{y}{3}$

$\ln y - \ln 3 =$

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*Exercises 35:* Write as a single log

$\frac{1}{5}\log z$

$\log \sqrt[5]{z}$

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*Exercises 36:* Sketch the function and state the domain and range, then analyze

$f(x) = \log_{\frac{1}{3}}(9x)$

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$f(x) = -\log_3 x - 2$

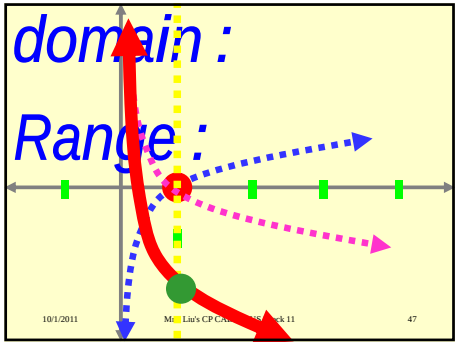
i) reflection over x - axis

ii) down 2



domain :

Range :





*Exercise 37:* Solve for x:

$$2^{x+1} = 3$$



**Example 38:** Solve

$$2e^{2x} + 5e^{x} - 3 = 0$$

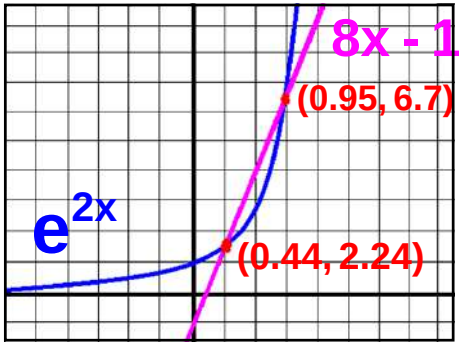


Examples 39:

$$e^{2x} - 8x + 1 = 0$$

$$e^{2x} = 8x - 1$$



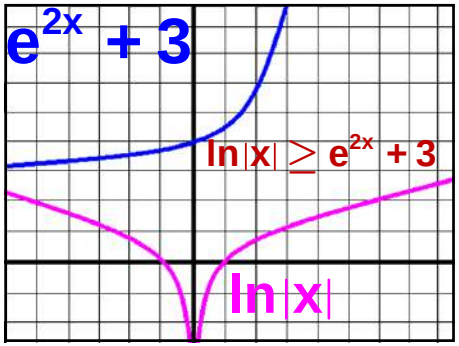


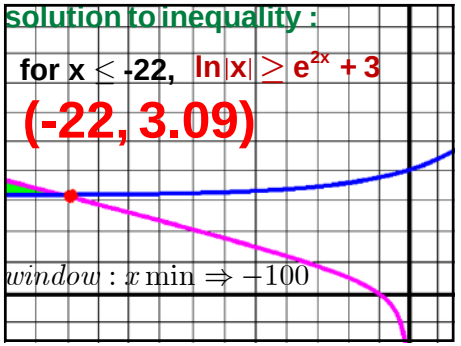

Examples 40: Solve for x

$$\ln|x| - e^{2x} \geq 3$$

$$\ln|x| \geq e^{2x} + 3$$





*Examples 41: Solve for x*

$2\log(x+1) - 2\log 6 < 0$



$2\log(x+1) - 2\log 6 < 0$

$x < 5 \quad x > -1$

$-1 < x < 5$



*Lesson Quiz #1:*

*Rewrite in exponential equation:* $\log_2 x = 5$

$2^5 = x$



*Lesson Quiz #2:*

*Rewrite in logarithmic equation:* $e^x = 7.3$

$\ln 7.3 = x$



*Lesson Quiz #3:*

*Evaluate:* $\log \frac{1}{\sqrt{100000}} - \frac{5}{2}$



*Lesson Quiz #4:*

*Evaluate* $\ln \frac{1}{\sqrt[3]{e^8}} - \frac{8}{3}$



*Lesson Quiz #5: Solve*

$\log x = -3$

$x = 0.001$



*Lesson Quiz 6:*

*Rewrite in as sum, difference or multiples of logs:* $\log A^3 B^4 = ?$



*Lesson Quiz 7:*

*Rewrite as a single log:*

$\frac{1}{3}\log_5 x + \frac{1}{2}\log_5 x$

*Lesson Quiz 8:*

Solve for x:

$-3\log_8 x + 4 = 5$

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*Lesson Quiz 9:* Write as a single log

$4\log(xy) - 3\log(yz)$

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*Lesson Quiz 10:*

Sketch and analyze the graph of

$f(x) = \ln(1 - x)^{-3}$

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*Lesson Quiz 11:*

Solve

$1.2^x \le \log_{1.2} x$

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***Lesson quiz 12:*** Solve for x

$$\frac{100}{5 + e^{-x}} = 4$$

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***Lesson quiz 13:***

Solve algebraically or graphically:

$$\frac{2^x + 2^{-x}}{2} = 3$$

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