

Common Logarithm $\log x = \log_{10} x$

base = 10

$$\Rightarrow \log x = \log_{10} x$$

no base $\Rightarrow$ automatically base should be 10base $e = e \approx 2.7$

Use a calculator to approximate each number to four decimal places

a. $\log 5312$

$$\log_{10}(5312) = 3.7253$$

b. $\frac{\log 6500}{\log 0.007}$

$$= \frac{\log 6500}{\log 0.007} = -1.7694$$

$$\downarrow \frac{3.8129}{\log(7 \times 10^{-3})} = \frac{3.8129}{\log 7 + (-3)} = \frac{3.8129}{-3.4515} = -1.1047$$

Use a calculator to approximate each number to four decimal places

a. $10^{3.1415}$

$$= 1385.16$$

b. $10^{-3.1415}$

$$= 0.0007219 = 7.219 \times 10^{-4} = 0.0007219$$

The number e : $e = 2.7182818284 \dots \approx 2.72$ Natural Logarithms: $\ln x$ means $\log_e x$: $\ln x = \log_e x$

Use a calculator to approximate each number to four decimal places

a. $\ln(4568)$

$$= 8.426$$

b. $\ln(0.84)$

$$= -0.1744$$

Use a calculator to approximate each number to four decimal places

a. $e^{3.06}$

$$= 21.327$$

b. $e^{-3.06}$

$$= 0.0469$$

$$\log_b a = \frac{\log a}{\log b}$$

$$\text{or } \log_b a = \frac{\ln a}{\ln b}$$

Some logarithms are not as easy to evaluate as those above, and will require the **change of base formula**.

$$\log_b a = \frac{\log_c a}{\log_c b}$$

Approximate each logarithm using the change of base formula

$$\log_5 34$$

$$= \log_5 34 = \frac{\log 34}{\log 5}$$

$$= 2.19$$

$$\log_2 98$$

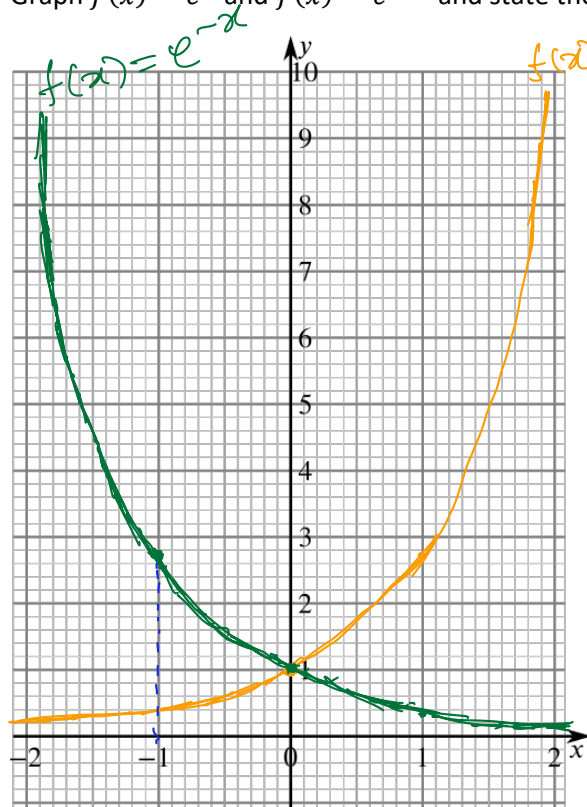
$$= \frac{\log 98}{\log 2}$$

$$= 6.6147$$

$$\log_{20} 4$$

$$= \underline{\underline{\text{hw.}}}$$

Graph $f(x) = e^x$ and $f(x) = e^{-x}$ and state the domain and range of the function



$$e^0 = 1$$

$$e^{-0} = 1$$

$$e^{-(-1)} = e$$

$$f(x) = e^x$$

$$\text{Domain} = (-\infty, \infty)$$

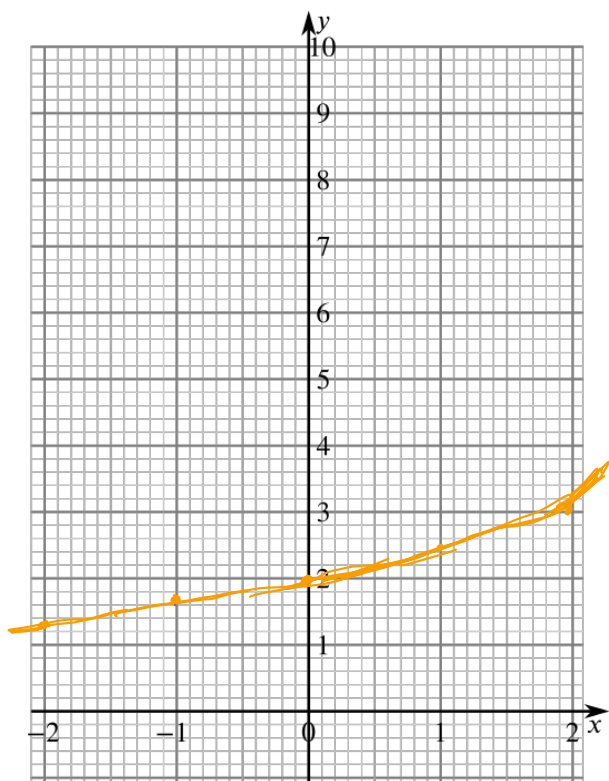
$$\text{Range} = (0, \infty)$$

$$f(x) = e^{-x}$$

$$\text{Domain} = (-\infty, \infty)$$

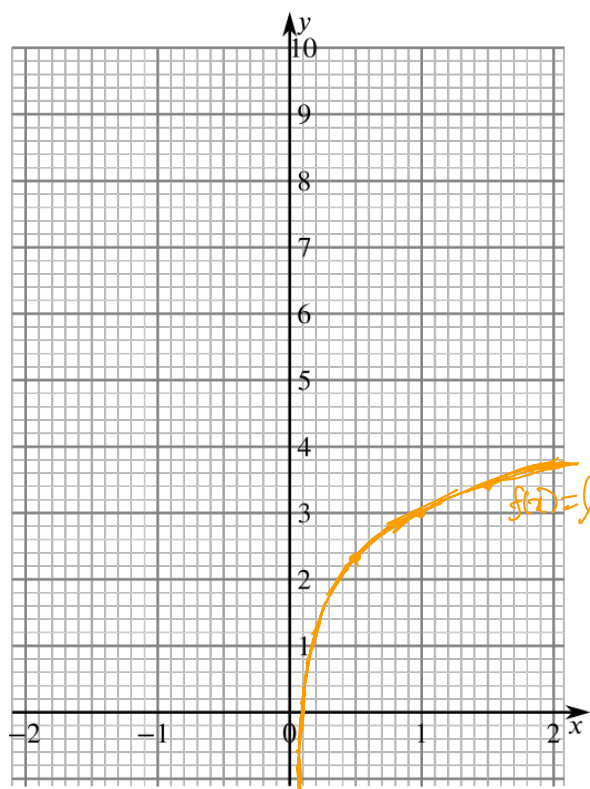
$$\text{Range} = (0, \infty)$$

Graph $f(x) = 2e^{0.2x}$ and state the domain and range of the function



<u>x</u>	<u><u>$f(x)$</u></u>
0	$2e^{0.2(0)} = 2$
5	$2e^{0.2(5)} = 2e \approx 2(2.72) = 5.44$
1	$\rightarrow 2e^{0.2} = 2.44$
2	$\rightarrow 2e^{0.4} = 2.98$
-1	$\rightarrow 2e^{-0.2} = 1.64$
-2	$\rightarrow 2e^{-0.4} = 1.34$

Graph $f(x) = \ln x + 3$



<u>x</u>	<u><u>$f(x)$</u></u>
0.5	$\ln(0.5) + 3 = 2.3$
1	$\ln(1) + 3 = 3$
1.5	$\ln(1.5) + 3 = 3.4$
2	$\ln(2) + 3 = 3.7$