EXERCISES [MAI 2.5-2.6]

EXPONENTS AND LOGARITHMS - I

SOLUTIONS

A. Paper 1 questions (SHORT)

EXPONENTIAL FUNCTIONS

1. (a)

$y = 2^x$	$y = 5^x$	$y = e^x$
(c)	(a)	(b)

$y = 2^{-x}$	$y = 5^{-x}$	$y = e^{-x}$
(d)	(f)	(e)

(b)

y – intercept	$y = 1$
Horizontal asymptote.	$y = 0$
Domain	$x \in \mathrm{R}$
Range	$y > 0$

2. (a) $y = 1$ (b) 0.25 (c) $b = 4$ $c = 16$ (d) $y = 0$ (f) $x \in \mathrm{R}$ $y > 0$

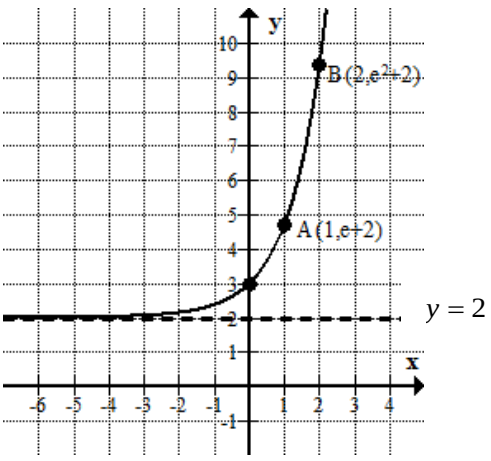
3. (a) $b = e^2 + 2$

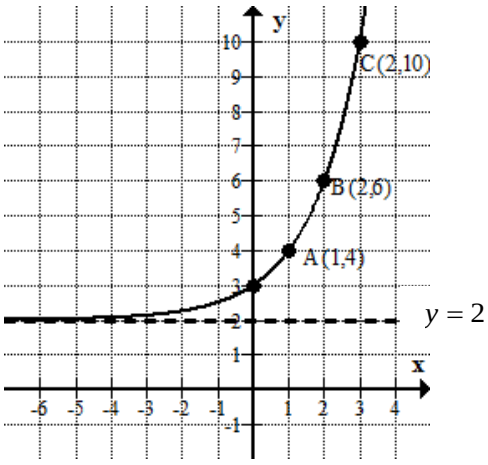
(b) y-intercept: (0,3), horizontal asymptote: $y = 2$

(c) Domain: $x \in R$, Range: $y > 2$

4. y-intercept: (0,3), horizontal asymptote: $y = 2$

Graphs for 3 and 4 are shown below





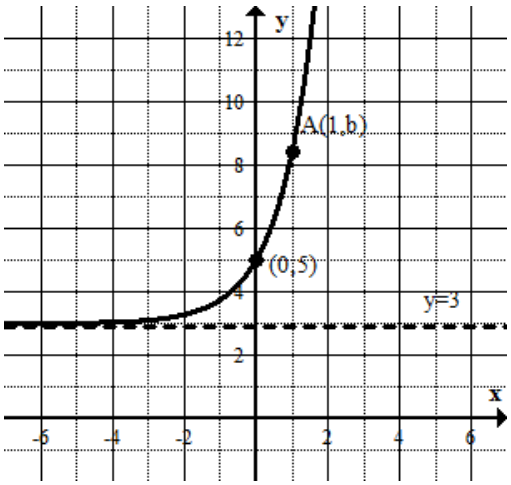
5.

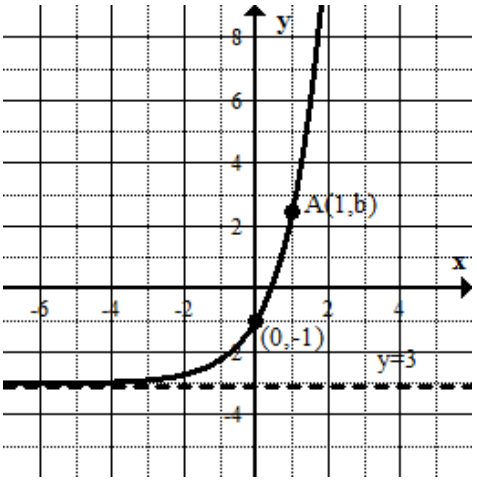
(a)

y- intercept: (0,5)	
h. asymptote: y=3	value of *b*: 2e+3
Domain: x∈R	Range: y>3

(b)

y- intercept: (0,-1)	*x*- intercept: ln(3/2)
h. asymptote: y= -3	value of *b*: 2e-3
Domain: x∈R	Range: y> -3





LOGARITHMS

6. (a) $x = \ln 3 \cong 1.10$ $y = \log 3 \cong 0.477$ (b) $e^x \cong 3$ $10^x \cong 3$

7.

$\log 100 = 2$	$\log 10 = 1$	$\log 1 = 0$
$\log \frac{1}{100} = -2$	$\log \frac{1}{10} = -1$	$\log 0.1 = -1$
$\log 10^{2020} = 2020$	$\log \sqrt{10} = 1/2$	$\log \sqrt[3]{10} = 1/3$
$\ln 1 = 0$	$\ln e = 1$	$\ln e^2 = 2$
$\ln \frac{1}{e} = -1$	$\ln \frac{1}{e^2} = -2$	$\ln \sqrt{e} = 1/2$

8. (a) $x = 10^3 = 1000$ (b) $x = e^3$ (c) $x + 1 = 10^3 = 1000 \Leftrightarrow x = 999$

9. (a) $k = 5$ (b) $k = 5$ (c) $k = 7$ (d) $k = 7$
$\log xy = \log x + \log y$ and $\ln xy = \ln x + \ln y$

10. (a) $k = 5$ (b) $k = 5$ (c) $k = 7$ (d) $k = 7$
$\log x^n = n \log x$ and $\ln x^n = n \ln x$

11. (a) $2x = 100 \Leftrightarrow x = 50$ (b) $2x + 4 = 10 \Leftrightarrow x = 3$ (c) $2x - 6 = 1 \Leftrightarrow x = 7/2$

12. (a) $x = 2$

(b)

$Ax = 3\ln 2 \equiv 3(0.693) \equiv 2.08$	$B = \ln 8 = 2.08$

(c)

$Ax = 3\log 2 \equiv 3(0301) \equiv 0.903$	$B = \log 8 = 0.903$

13. (a) $y=\log_2 x$ (b) (1,0)

14. (a) $x = -1$ (b) (i) $\ln(0.001) = -6.91$ (ii) $e^0 = 1$ (c) (4.64, 1.89)