

**Question 1**

Point A(2, -13) belongs to an exponential function of the form  $f(x) = \pm c^x + k$ . Knowing that the equation of the asymptote is  $y = -4$ , find the equation of the exponential function  $f$ .

**Question 2**

Solve the following equation algebraically.

$$7^{(-8-2x)} = 49^{(3x+4)}$$

**Question 3**

Solve the following equation algebraically.

$$9^{(x-3)} = 125^{(x+1)}$$

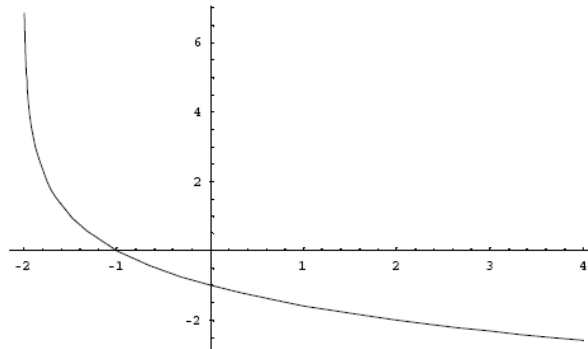
**Question 4**

Find the inverse of the following function:

$$f(x) = \log_7(x - 3)$$

**Question 5**

Given  $f$ , a logarithmic function defined by  $f(x) = \log_c b(x-h)$  and whose graph is given below:



Which of the following is TRUE?

A)  $b > 0$ ,  $h < 0$  and  $0 < c < 1$

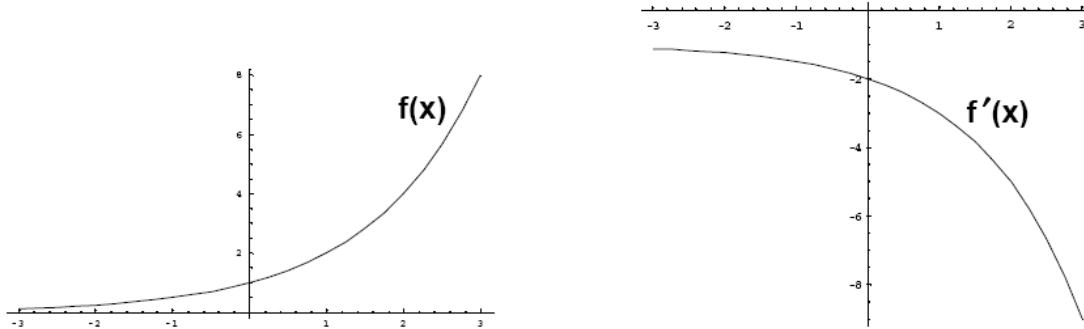
C)  $b > 0$ ,  $h < 0$  and  $c > 1$

B)  $b > 0$ ,  $h > 0$  and  $c > 1$

D)  $b < 0$ ,  $h < 0$  and  $c < 1$

**Question 6**

Given the graphs of  $f$ , an exponential function of the form  $f(x) = a(c^{bx}) + k$  and function  $f'$ , obtained from  $f$  by modifying certain parameters:



In looking at the graphs of these functions, determine among the following choices which combination allows us to transform  $f$  to  $f'$ .

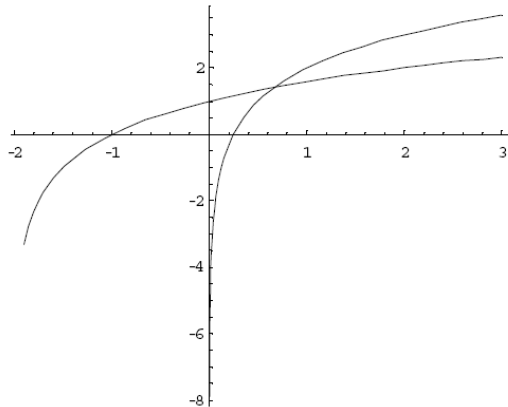
- A) The sign of  $a$  changed and  $k$  increased.
- B) The sign of  $a$  changed and  $k$  decreased.
- C) The signs of  $a$  and  $b$  changed.
- D) The sign of  $b$  changed and  $k$  increased.

**Question 7**

Given the two following graphs and equations:

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

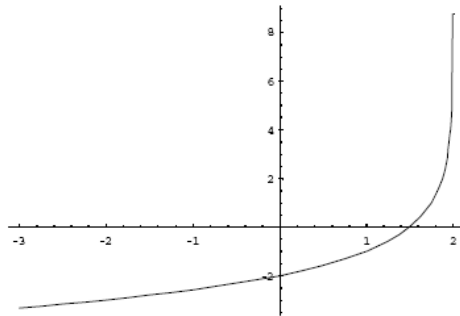
$$g(x) = \log_2 x + 2$$



- a) Determine for which value of the domain  $f(x) = g(x)$ .
- b) Determine for which values of  $x$   $f(x) \leq g(x)$ .
- c) Do these functions have the same asymptote?
- d) The  $y$ -intercept of function  $f$  is  $y=1$  and that of  $g$  does not have a  $y$ -intercept. True or false?

**Question 8**

The graph of function  $f$ , defined by the equation  $f(x) = -\log_2(2-x) - 1$ , is given below:



Determine if the statements below are true or false. If they are false, correct the statement.

Statement	True or False	Correction (if necessary)
a) The point $(0, -2)$ belongs to the graph of the function.		
b) The equation of the asymptote is $y = -4$		
c) The domain of the function is $-\infty, 2 [$		
d) The range of the function is $] -4, \infty$		

**Question 9**

Over the next few years, we predict that the price of a house will increase 2% every 2 years.

If  $V(T)$  corresponds to the value of a house after  $t$  years, what is the equation that represents this situation if the initial value of the house was \$125 000?

**Question 10**

Determine the value of the logarithmic expression below using the laws of logs.

$$5 (\log_a a^3)^2 - 2 \log_{1/a} 1 + \log_a a^{-3}$$

**Question 11**

Simplify the following expression using the laws of logs.

$$\log_5(x^2 + x - 6) - \log_{1/5} 5(x^2 - 9) - \log_5 (x + 3)^2(x^2 - 5x + 6)$$

**Question 12**

Solve the following equation algebraically using the laws of logs.

$$\log_2 x + 9 \log_x 2 = 6$$



**Question 15**

Two brothers, Chris and Tony, each start a home-based business. Their profits approximate a logarithmic function:

$$\begin{array}{ll} f(x) = 2 \log x + 3 & \text{for Chris} \\ \text{and } g(x) = 5 \log x & \text{for Tony} \end{array}$$

Where  $x$  represents the number of years since they started and  $f(x)$  and  $g(x)$  represent the profit after  $x$  years.

a) After how many years will Tony start making a profit?

b) After how many years will their profits be equal? How much will they be making at that point?