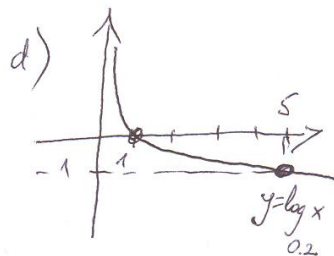
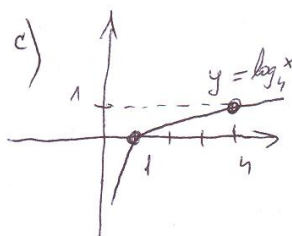
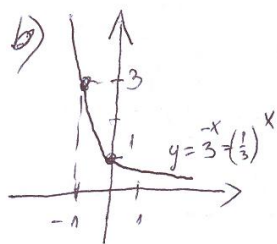
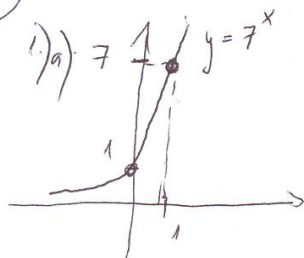


(A)



2.) a) $\log_{27} 81 = x \Rightarrow 81 = 27^x \Rightarrow 3^4 = 3^{3x} \Rightarrow 3x = 4 \Rightarrow x = \frac{4}{3}$

b) $x = 32^{\log_2 3} = (2^5)^{\log_2 3} = (2^{\log_2 3})^5 = 3^5 = 243$

c) $\log_9 x = -0.5 \Rightarrow x = 9^{-0.5} = 9^{-\frac{1}{2}} = \frac{1}{9^{\frac{1}{2}}} = \frac{1}{(\sqrt{9})^{\frac{1}{2}}} = \frac{1}{3}$

d) $\log x = 3 + 2 \cdot \log 3 - \log 5 = \log 10^3 + \log 3^2 - \log 5 = \log \frac{1000 \cdot 9}{5}$
 $x = \frac{1000 \cdot 9}{5} = 1800$

e) $x = \log_{\sqrt{\frac{1}{3}}} 25 \cdot \log_{0.2} 27 = \frac{\log 25}{\log \frac{1}{3}} \cdot \frac{\log 27}{\log 0.2} = \frac{\log 5^2}{\log 3^{-1}} \cdot \frac{\log 3^3}{\log 5^{-1}} =$
 $= \frac{2 \cdot \log 5}{-1 \cdot \log 3} \cdot \frac{3 \cdot \log 3}{-1 \cdot \log 5} = \frac{2 \cdot 3}{-1 \cdot (-1)} = 6$

3.) a) $9^x = 13 \Rightarrow x = \log_9 13 = \frac{\log 13}{\log 9} = 1.16735876$

b) $x = \log_{15} 37 = \frac{\log 37}{\log 15} = 1.333401394$

c) $x = 200^{700} \Rightarrow \log x = \log 200^{700} = 700 \cdot \log 200$

$\log x = 1610.720997$

$x = 10^{1610.720997} = 10^{1610} \cdot 10^{0.720997}$

$x = 5.26013584 \cdot 10^{1610}$

t.) a) $0.1^{2x-3} = 100^{3x-1}$
 $(10^{-1})^{2x-3} = (10^2)^{3x-1}$
 $10^{-2x+3} = 10^{6x-2}$
 $-2x+3 = 6x-2$
 $-8x = -5 \quad | :(-8)$
 $x = \frac{5}{8}$

b) $5^x + 2 \cdot 5^{x+1} = 22$
 $5^x + 2 \cdot 5^x \cdot 5^1 = 22$
 $5^x \cdot (1 + 10) = 22 \quad | :11$
 $5^x = 2$
 $x = \log_5 2$

c) $\log_7(\log_3 x + 5) = 1$
 $x > 0$
 $\log_7(\quad) = 1 \Rightarrow (\quad) = 7$
 $\Rightarrow \log_3 x + 5 = 7$
 $\log_3 x = 2$
 $x = 3^2 = 9$

d) $\log(x-4) + \log x = \log 3$

$\Rightarrow x-4 > 0 \quad \wedge \quad x > 0$
 $x > 4$

~~$x \in (0, 4)$~~ $\Rightarrow x \in (4, \infty)$

$\log((x-4) \cdot x) = \log 3$

$x^2 - 4x = 3 \Rightarrow x^2 - 4x - 3 = 0 \quad x_{1,2} = \frac{4 \pm 5}{2} \quad \boxed{x_1 = 5} \quad x_2 = -1$

e) $9^x - 5 \cdot 3^x + 6 = 0 \quad : \quad 3^x = y, \quad 9^x = y^2$

$\Rightarrow y^2 - 5y + 6 = 0 \quad y_{1,2} = \frac{5 \pm 1}{2}$

$y_1 = 3$
 $3^x = 3$
 $x_1 = 1$

$y_2 = 2$
 $3^x = 2$
 $x_2 = \log_3 2$

f) $\log^2 x - \log x - 12 = 0 \quad x > 0$
 $\log x = y \Rightarrow y^2 - y - 12 = 0 \quad y_{1,2} = \frac{1 \pm 7}{2}$
 $y_1 = 4 \quad y_2 = -3$
 $\log x = 4 \quad \log x = -3$
 $x_1 = 10^4 = 10000, \quad x_2 = 10^{-3} = 0.001$

g) $\frac{2}{\log x} + \frac{\log x + 1}{\log x - 3} = 1$

$x > 0$
 $\log x \neq 0 \Rightarrow x \neq 1$
 $\log x \neq 3 \Rightarrow x \neq 10^3$

$\log x = y : \frac{2}{y} + \frac{y+1}{y-3} = 1$

$\cdot y(y-3) \Rightarrow \begin{cases} 2 \cdot (y-3) + (y+1) \cdot y = 1 \cdot y(y-3) \\ 2y - 6 + y^2 + y = y^2 - 3y \\ 6y = 6 \Rightarrow y = 1 \end{cases}$

$y = 1 \Rightarrow \log x = 1 \Rightarrow x = 10^1 = 10 \checkmark$

5.) a) $4^x \leq 8$
 $2^{2x} \leq 2^3$
 $2x \leq 3 \quad | :2$
 $x \leq \frac{3}{2}$
 $x \in (-\infty, \frac{3}{2}]$

b) $0.1^{x-1} < 5$
 $a=0.1 \rightarrow$
 $\text{pade} \quad x-1 > \log_5 5$
 $x > \frac{\log 5}{\log 0.1} + 1$
 $x > -\log_5 5 + 1$
 $x \in (1 - \log_5 5, \infty)$

c) $\log_9 x > 2$
 $a=9$
 $\text{rante} \Rightarrow x > 9^2$
 $x \in (81, \infty)$
 ii) $(10^{-1})^{x-1} \leq 5$
 $10^{-x+1} \leq 5$
 $a=10$
 $\text{rante} \Rightarrow -x+1 < \log_5 5 \Rightarrow -x < \log_5 5 - 1 \quad | \cdot (-1)$
 $x > 1 - \log_5 5$

d) $\log(x+3) \geq -1$
 0.2
 $a=0.2 \Rightarrow x+3 \leq 0.2^{-1} \quad \wedge \quad x+3 > 0$
 $x \leq 5-3$
 $x \leq -2$
 $x > -3$
 $x \in (-3, -2]$

6.) a) $a = \log_3 2$

$\log_3 24 = \log_3 2 \cdot 3 = \log_3 2 + \log_3 3 = a + 1$

b) $a \cdot e^n = b \quad | :a \Rightarrow e^n = \frac{b}{a}$
 $n = \ln\left(\frac{b}{a}\right)$