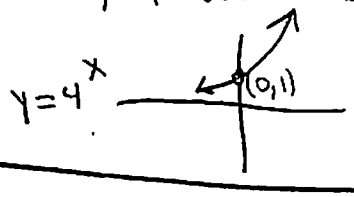
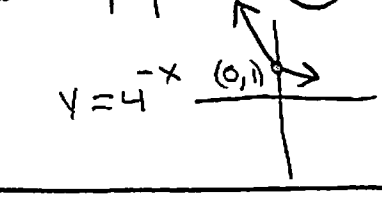
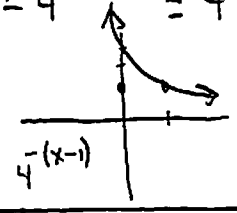
Math 1111 Practice Problems Test 4 Solutions

1) Match the graph. (G) $y = 4^{1-x} = 4^{-x+1} = 4^{-(x-1)}$







reflect y axis; shift right 1

2) $f(x) = 2^{-x} - 3$ choice (D)

reflect y axis; down 3

Domain $= (-\infty, \infty)$ look left to right

Range $= (-3, \infty)$ look up & down

H.A. $y = -3$

3) $f(x) = -2^{-x} + 3$ choice (D)

reflect x axis; reflect y axis; up 3

Domain $= (-\infty, \infty)$

Range $= (-\infty, 3)$

H.A. $y = 3$

4) Solve

$\left(\frac{3}{5}\right)^x = \frac{27}{125}$

$\left(\frac{3}{5}\right)^x = \left(\frac{3}{5}\right)^3$

$x = 3$

5) $2^{4x+1} = 8$

$2^{4x+1} = 2^3$

$4x + 1 = 3$

$4x = 2$

$x = \frac{1}{2}$

6) $3.4 = a^8$

$\log_a 3.4 = 8$

7) $\log_2 16 = x$

$2^x = 16$

8) $\log_4(64) = x$

$4^x = 64$

$4^x = 4^3$

$\boxed{x = 3}$

9) $f(x) = \ln(x-3)$

for logarithm base must be positive
+ argument must be positive

Do $x - 3 > 0$

$x > 3$

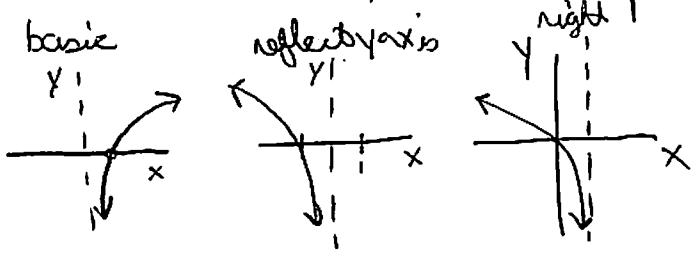
$\boxed{(3, \infty)}$

10) use calculator:

$$\frac{\ln\frac{24}{17}}{0.07} = \ln(24/17)/.07$$

$$= \boxed{4.926}$$

11) shift right 1, reflect y axis



$y = \log_4(1-x) = \log_4(-x+1)$

choice (H) $= \boxed{\log_4 -(x-1)}$

12) $\log_4 x = 2$

$4^2 = x$

$\boxed{x = 16}$

13) $\log_2(7x+5) = 4$

$2^4 = 7x+5$

$16 = 7x+5$

$\frac{11}{7} = \frac{7x}{7}$

$\boxed{x = \frac{11}{7}}$

14) $e^{8x} = 3$

$\ln e^{8x} = \ln 3$

$\frac{8x \ln e}{8} = \frac{\ln 3}{8}$

$\boxed{x = \frac{\ln 3}{8}}$ or $\boxed{.137}$

15) $\log_6 24 - \log_6 4$

$\log_6 \frac{24}{4} = \log_6 6 = 1$

16) $\ln 2 = r \quad \ln 9 = s$

$\ln 4.5 = \ln \frac{9}{2} = \ln 9 - \ln 2$

$= s - r$

17) $\log_7 (343x)$

$= \log_7 343 + \log_7 x$

$= \log_7 7^3 + \log_7 x$

$= 3 + \log_7 x$

18) $6 \log_7 u + 7 \log_7 v$

$= \log_7 u^6 + \log_7 v^7$

$= \log_7 (u^6 v^7)$

19) $\log_4 (x^2-4) - 5 \log_4 (x+2)$

$= \log_4 (x^2-4) - \log_4 (x+2)^5$

$= \log_4 \left(\frac{x^2-4}{(x+2)^5} \right) = \log_4 \frac{(x+2)(x-2)}{(x+2)(x+2)^4}$

$= \log_4 \left(\frac{x-2}{(x+2)^4} \right)$

20) $\log_2 14 = \frac{\log 14}{\log 2}$

$= 3.807$

21) $\log_{\frac{1}{5}} 7$

$= \frac{\log 7}{\log \frac{1}{5}} = -1.209$

22) $\log_4 (3x) = 2$

$4^2 = 3x$

$16 = 3x$

$x = \frac{16}{3}$ check? positive

23) $3 \log_2 x = -\log_2 8$

$\log_2 x^3 = \log_2 8^{-1}$

$\sqrt[3]{x^3} = \sqrt[3]{\frac{1}{8}}$

$x = \frac{1}{2}$ check positive?

24) $\log_2(x+11) + \log_2(x+18) = 3$

$\log_2(x+11)(x+18) = 3$

$(x+11)(x+18) = 2^3$

$x^2+29x+198 = 8$

$x^2+29x+190 = 0$

$(x+19)(x+10) = 0$

$x = -19$ ~~$x = -19$~~ check? not allowed

$x = -10$ only

25) $5^x = 3$

$\ln 5^x = \ln 3$

$\frac{x \ln 5}{\ln 5} = \frac{\ln 3}{\ln 5}$

$x = \frac{\ln 3}{\ln 5} = .683$

26) $6^{1-9x} = 5^x$

$\ln 6^{1-9x} = \ln 5^x$

$(1-9x)\ln 6 = x \ln(5)$

$\ln 6 - 9x \ln 6 = x \ln 5$

$\ln 6 = x \ln 5 + 9x \ln 6$

$\frac{\ln 6}{\ln 5 + 9\ln 6} = \frac{x(\ln 5 + 9\ln 6)}{\ln 5 + 9\ln 6}$

$x = \frac{\ln 6}{\ln 5 + 9\ln 6}$

27) $A = P\left(1+\frac{r}{n}\right)^{n \cdot t}$

$A =$
$P = 200$
$n = 4$
$r = .02$
$t = 2$

$A = 200\left(1+\frac{.02}{4}\right)^{4(2)}$ calculator

$= 208.14$

28) $A = P\left(1+\frac{r}{n}\right)^{n \cdot t}$

$A = 150$
$P = 100$
$n = 4$
$r = .08$
$t =$

$\frac{150}{100} = \frac{100}{100}\left(1+\frac{.08}{4}\right)^{4t}$

$\frac{3}{2} = 1.02^{4t}$

$\ln \frac{3}{2} = \ln 1.02^{4t}$

$\ln \frac{3}{2} = 4t(\ln 1.02)$

$t = \frac{\ln \frac{3}{2}}{4(\ln 1.02)} = 5.12$ yrs

$A = Pe^{rt}$

$150 = 100e^{.08t}$

$\frac{3}{2} = e^{.08t}$

$\ln \frac{3}{2} = \ln e^{.08t}$

$\ln \frac{3}{2} = .08t$

$t = \frac{\ln \frac{3}{2}}{.08}$

$= 5.07$ years