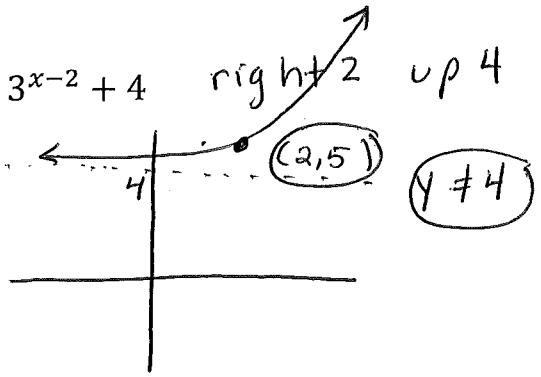
MAC1105 Test 3 Name Key

D. Howard (3-16)

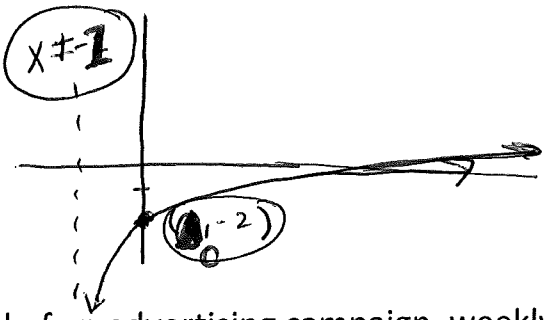
11 each

1. Sketch a complete graph of each of the following. Include the equation of the asymptote, as well as, the coordinate of the shifted point.

a.) $f(x) = 3^{x-2} + 4$ right 2 up 4



b.) $f(x) = \log(x+1) - 2$ left 1 down 2



2. At the end of an advertising campaign, weekly sales declined according to the equation $f(x) = 17{,}000(9^{-0.07x})$ dollars, where *x* is the number of weeks after the end of the campaign.

a.) Determine the sales at the end of the ad campaign.

$x = 0$

$f(0) = 17{,}000$

b.) Does the model indicate that sales will eventually reach $0?

No, it will get closer to 0.

3. Use $A = Pe^{rt}$. Let \$6,000 be invested at 10% interest compounded continuously.

a.) What is the future value after 5 years?

$A = 6000e^{0.10(5)} = \$9892.33$

b.) When will the initial investment of \$6000 double?

$$\frac{12,000}{6,000} = \frac{6,000e^{0.10t}}{6,000}$$

$$2 = e^{0.10t}$$

$$\frac{\ln(2)}{0.10} = \frac{0.10t}{0.10}$$

$t = 6.93$

4. Evaluate each of the following.

a.) $\log_5(125) =$ 3

$5^{?} = 125$

b.) $\log_6(1) =$ 0

$6^{?} = 1$

c.) $\log_4(\frac{1}{256}) =$ -4

$4^{?} = \frac{1}{256} = \frac{1}{4^4} = 4^{-4}$

d.) $\ln(e^{-2}) =$ -2

e.) $\log_2(-1) =$ $\emptyset$

$2^{?} = -1$

domain
$2x+1 > 0$
$x > -1/2$

5. Solve $log_6(2x+1) = 2$

$6^2 = 2x+1$

$36 = 2x+1$

$-1 \quad -1$

$\frac{35}{2} = \frac{2x}{2}$

$17.5 = x$

6. Solve $\frac{4e^{9x}}{4} = \frac{1972}{4}$

$e^{9x} = 493$

$\frac{\ln(493)}{9} = \frac{9x}{9}$

$0.69 = x$

7. Find the decibel reading for a sound with intensity 20,000 times I_0, where $L = 10log\left(\frac{I}{I_0}\right)$.

$L = 10 \log\left(\frac{20{,}000\, I_0}{I_0}\right)$

$L = 10 \log(20{,}000)$

$L = 43.01$

900
1, 900
20, 45
3, 300
5, 180
6, 150
9, 100

8. Solve $2\log(x) - \log(6x - 90) - 1 = 0$

$\log(x)^2 - \log(6x-90) = 1$

$\log_{10}\left(\frac{x^2}{6x-90}\right) = 1$

$\frac{x^2}{6x-90} = \frac{1}{10}$

$x^2(1) = (6x-90)(10)$

$x^2 = 60x - 900$

$x^2 - 60x + 900 = 0$

$(x-30)(x-30) = 0$

Q.F.

$x = \frac{-(-60) \pm \sqrt{(-60)^2 - 4(1)(900}}{2(1)}$

$x = \frac{60 \pm \sqrt{3600 - 3600}}{2} = 30$

imaginary

no real solution

9. a.) Express as a sum or difference of logarithms. $\ln\left(\frac{z^3 x}{yw^2}\right)$

$\ln(z^3) + \ln(x) - \ln(y) - \ln(w^2)$

b.) Write as a single logarithm $3\log(y) + 2\log(z) - 4\log(x+1)$

$= \log(y^3) + \log(z^2) - \log(x+1)^4$

$= \log\left(\frac{y^3 z^2}{(x+1)^4}\right)$