

Quiz 4

Key

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. Solve for x in the following equations:

(a) [2] (WebHW10 #12)

$$\frac{4(1 + 10^{4x})}{4} = \frac{6}{4}$$

order of op (+.5)
log (+.5) used correctly (+.5)
alg (+.5)

$$1 + 10^{4x} = \frac{3}{2}$$

$$10^{4x} = \frac{3}{2} - 1 = \frac{3}{2} - \frac{2}{2}$$

$$10^{4x} = \frac{1}{2}$$

$$\log 10^{4x} = \log \frac{1}{2}$$

$$4x = \log \frac{1}{2}$$

$$x = \frac{\log \frac{1}{2}}{4}$$

(b) [2] (§4.4 #43)

$$\log_2(3) + \log_2(x) = \log_2(5) + \log_2(x-2)$$

log prop (+.5)
exp (+.5) used correct (+.5)
alg (+.5)

$\log_2(3x) = \log_2(5(x-2))$ by property 1
take both sides thru exp. with base 2

$$\cancel{2} \log_2(3x) = \cancel{2} \log_2(5(x-2))$$

prop of inverses

$$3x = 5(x-2)$$

$$3x = 5x - 10$$

$$-3x \quad -3x$$

$$0 = 2x - 10$$

$$+10 \quad +10$$

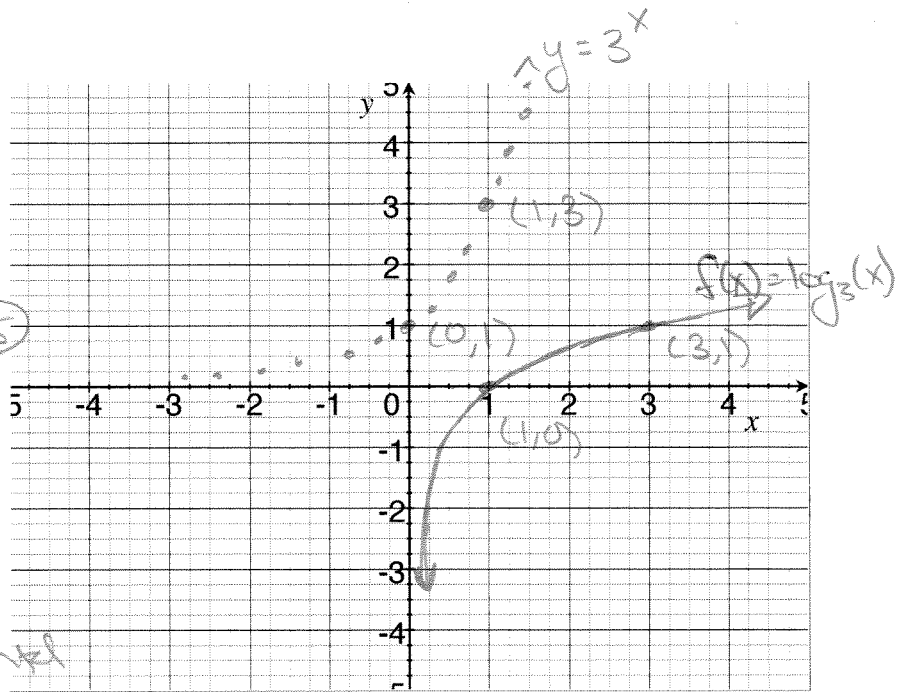
$$\frac{10}{2} = \frac{2x}{2}$$

$$5 = x$$

2. Let $f(x) = \log_3(x)$

(a) [1] Graph f on the axis provided.

shape +5
correct/precise +5



(b) [1] (§4.2) Does f have an inverse function, why or why not?

yes
The graph passes the horizontal line test.

(c) [2] (§4.2 #54) Describe the graph transformations needed to transform the graph of f into the function $y = \log_3(x - 1) - 2$.

right 1 unit +5
down 2 units +5
vert +5

3. [2] (WebHW9 #18) How long will it take for an investment of \$1000 to double in value if the interest rate is 8.5% per year, compounded continuously?

Note: guess and check is *not* the way to get credit for this problem. However, approximations using some algebraic technique will.

Rule of 70:

$$\frac{70}{.085} = \frac{70}{8.5}$$

$P e^{rt}$ = Amount after t years
we want to find when t so that
 $2000 = 1000 \cdot e^{.085t}$

$$\frac{2000}{1000} = \frac{1000}{1000} e^{.085t}$$

$$2 = e^{.085t} \quad \ln \text{ both sides}$$

$$\ln 2 = .085t$$

$$\Rightarrow t = \frac{\ln 2}{.085} \approx 8.1 \text{ years}$$