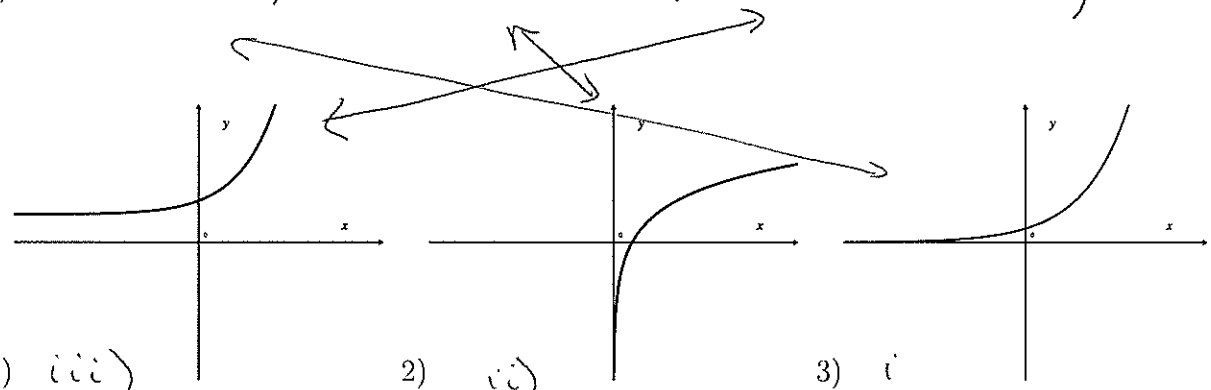
Quiz 5 Key

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

1. [3] (WebHW 7 #3 & §4.2 #38) Assume that A, B, and C are positive numbers. Match the following functions to their corresponding graphs:

(+1 each) i) $y = A^x$ 3) ii) $y = \log_B(x)$ 2) iii) $y = A + e^{Cx}$ 1)



1) iii) 2) ii) 3) i

2. (§4.2 #51) Let $f(x) = \ln(2 - 3x)$. Find:

(a) [1] the range of f

Recall the graph of $\ln x$ looks like 2) in the above problem. which has a range of all $\mathbb{R}$ / $(-\infty, \infty)$ (+.5)

Since $f(x) = \ln(2-3x)$ is the graph of $\ln x$ with horizontal graph transformations, the range of f is also $\mathbb{R}$ / $(-\infty, \infty)$ (+.5)

(b) [1] the domain of f

Recall the domain of $\ln x$ is $(0, \infty)$ / $x > 0$ (+.5)

Thus for $f(x) = \ln(2-3x)$, the domain is all x so that

$2 - 3x > 0$

$\Rightarrow \quad -3x > -2$

$\Rightarrow \quad x < 2/3$ or $(-\infty, 2/3)$ (+.5)

3. [1] (WebHWW8 #1) Evaluate the expression: $\log_3 \sqrt{27}$

$\log_3 \sqrt{27} = \log_3 (3^3)^{1/2} = \log_3 3^{3/2} = \frac{3}{2}$ (+1.5 exp, +1.5 undo)

or

$\log_3 \sqrt{27} = \frac{\log \sqrt{27}}{\log 3}$ (+1.5)

$= \frac{\log 3^{3/2}}{\log 3} = \frac{3/2 \log 3}{\log 3} = 3/2$ (+

4. [4] (WebHW8 #16 & §4.4 #71) Find all possible solutions for both of the equations below:

$\log_6(4) - \log_6(x) = \log_6(x-4) - \log_6(9)$

$+\log_6(9) \qquad +\log_6(9)$

$\log_6(4) + \log_6(9) - \log_6(x) = \log_6(x-4)$

$+\log_6(x) \qquad +\log_6(x)$

Prop 1 $\log_6(4 \cdot 9) = \log_6(x-4) + \log_6(x)$

Prop 1 $\log_6(36) = \log_6[x(x-4)]$

take both sides the exp function w/ base 6

$\log_6 36 = \log_6(x(x-4))$

$36 = x(x-4)$ used prop's (+1)

$36 = x^2 - 4x$ alg/order of op (+1)

complete the $\square$

$+2^2 \qquad +2^2$ quadratic (+1.5)

$40 = (x-2)^2$ check roots (+1.5)

$\pm\sqrt{40} = x - 2$

$2 \pm 2\sqrt{10} = x$

note $\log(2 - 2\sqrt{10})$ is not defined?

note $2 + 2\sqrt{10}$ works in the orginal eq.

Thus $x = 2 + 2\sqrt{10} \approx 8.325$ 2

$\frac{2000}{1000} = \frac{1000 e^{.085x}}{1000}$ order of op (+1.5)

used ln correctly (+1.5

$2 = e^{.085x}$

ln both sides

$\ln 2 = .085x$

$\frac{\ln 2}{.085} = \frac{.085x}{.085}$

$x = \frac{\ln 2}{.085} \approx 8.155$

note $\frac{\ln 2}{.085}$ works in orginal eq