MATH 253
QUIZ 3
SEPTEMBER 23, 2009

NAME: SOLUTIONS

SHOW YOUR WORK FOR FULL CREDIT.

1. Find the inverse function of $f(x) = x^2 - 2,\ x \le 0$.

$y = x^2 - 2,\ x \le 0$

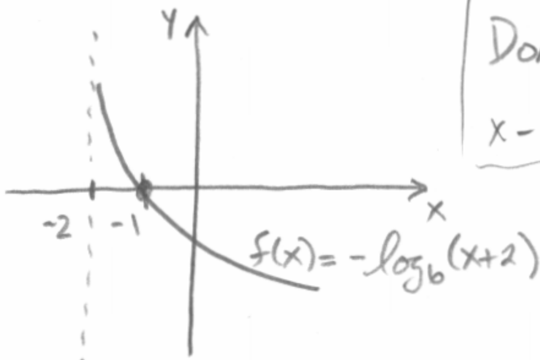
$x = y^2 - 2,\ y \le 0$

$x + 2 = y^2,\ y \le 0$

$y = \pm\sqrt{x+2},\ y \le 0,\ x \ge -2$

$\boxed{f^{-1}(x) = -\sqrt{x+2},\ x \ge -2}$

2. Find the domain, x-intercept, and vertical asymptote of the function $f(x) = -\log_6(x+2)$ and sketch its graph.



$\boxed{\text{DOMAIN: } (-2, \infty)}$

$\boxed{x\text{-INT.: } (-1, 0)}$

$\boxed{\text{V.A.: } x = -2}$

3. Evaluate $\log_a a^{-5}$.

$\log_a a^{-5} = -5 \log_a a = -5(1) = \boxed{-5}$

4. Expand the expression $\ln \dfrac{x^4}{\sqrt{y}\, z^5}$ as a sum, difference, and/or constant multiple of logarithms.

$\ln x^4 - \ln y^{1/2} z^5 = 4 \ln x - [\ln y^{1/2} + \ln z^5]$

$= \boxed{4 \ln x - \frac{1}{2} \ln y - 5 \ln z}$

5. Condense the expression $\ln x - 4\left[\ln(x+2) + \ln(x-2)\right]$ to the logarithm of a single quantity.

$\ln x - 4 \ln (x+2)(x-2) = \ln x - 4 \ln (x^2 - 4)$

$= \ln x - \ln (x^2 - 4)^4$

$= \boxed{\ln \dfrac{x}{(x^2-4)^4}}$