MAT 202 7.1, 7.2

Spring, 2013 Name___________________________

1. The function $f(x) = x^2 - 6x + 13$ is *not* 1-to-1, but there are two ways to restrict its domain to obtain a maximal domain on which f is 1-to-1. On each of these (two) domains, there *is* an inverse for f. I want you to find these two domains and the respective inverse functions. State the domain and range of f and f^{-1} for both domains. (You'll find a domain and for f and that will give you a particular f^{-1} and a corresponding domain and range. You'll use the *other* (maximal) domain and range and a corresponding domain and range for f^{-1}.)

2. Find the inverse of $f(x) = \dfrac{\sqrt{x}}{\sqrt{x} - 3}$. Find the derivative, $\left(f^{-1}\right)'(2)$ in 2 ways:

   a. Directly, by computing f^{-1} and evaluating $\left(f^{-1}\right)'(2)$.
   b. Using Theorem 7.1.1 (Theorem 1, in Section 7.1)

3. Let $f(x) = x^3 - 4x^2 - 7x + 13$. The function f is 1-to-1, if you restrict its domain to the interval [-1, 3], so it *does* have an inverse f^{-1} over that interval. What I want you to do is find $\left(f^{-1}\right)'(3)$.

4. Express $\ln(35) + \dfrac{\ln\left(\frac{1}{7}\right)}{\ln(25)}$ in terms of $\ln(5)$ and $\ln(7)$.

5. Differentiate with respect to the given independent variable:

   a. $\ln(\sec(x) + \tan(x))$. (What does this tell you about $\int \sec(x)dx$?)
   b. $\ln\left(x^3\right)$
   c. $(\ln(x))^3$
   d. $\ln\left(\dfrac{x^3 - 17x}{5x^2 + 27}\right)$

6. Use logarithmic differentiation to find the derivative.

   a. $\dfrac{d}{d\theta}\left[\sqrt{\dfrac{\theta}{\theta + 1}}\right]$ (And you BETTER do it better than *I* did, in class!)
   b. $\dfrac{d}{dx}\left[\sqrt[7]{\dfrac{x(x+1)(x-2)}{\left(x^2+1\right)(2x+3)}}\right]$