1. True. If f is one-to-one, with domain $\mathbb{R}$, then $f^{-1}(f(6)) = 6$ by the first cancellation equation in (3.2.4).

2. False. By Theorem 3.2.7, $(f^{-1})'(6) = \dfrac{1}{f'(f^{-1}(6))}$, *not* $\dfrac{1}{f'(6)}$ unless $f^{-1}(6) = 6$.

3. False. For example, $\cos\frac{\pi}{2} = \cos\left(-\frac{\pi}{2}\right)$, so $\cos x$ is not 1-1.

4. False. It is true that $\tan\frac{3\pi}{4} = -1$, but since the range of $\tan^{-1}$ is $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, we must have $\tan^{-1}(-1) = -\frac{\pi}{4}$.

5. True, since $\ln x$ is an increasing function on $(0, \infty)$.

6. True. $\pi^{\sqrt{5}} = (e^{\ln\pi})^{\sqrt{5}} = e^{\sqrt{5}\ln\pi}$

7. True. We can divide by e^x since $e^x \neq 0$ for every x.

8. False. For example, $\ln(1+1) = \ln 2$, but $\ln 1 + \ln 1 = 0$. In fact $\ln a + \ln b = \ln(ab)$.

9. False. Let $x = e$. Then $(\ln x)^6 = (\ln e)^6 = 1^6 = 1$, but $6\ln x = 6\ln e = 6 \cdot 1 = 6 \neq 1 = (\ln x)^6$. What *is* true, however, is that $\ln(x^6) = 6\ln x$ for $x > 0$.

10. False. $\dfrac{d}{dx}(10^x) = 10^x \ln 10$, which is not equal to $x10^{x-1}$.

11. False. $\ln 10$ is a constant, so its derivative, $\dfrac{d}{dx}(\ln 10)$, is 0, not $\frac{1}{10}$.

12. True. $y = e^{3x} \;\Rightarrow\; \ln y = 3x \;\Rightarrow\; x = \frac{1}{3}\ln y \;\Rightarrow$ the inverse function is $y = \frac{1}{3}\ln x$.

13. False. The "-1" is not an exponent; it is an indication of an inverse function.

14. False. For example, $\tan^{-1} 20$ is defined; $\sin^{-1} 20$ and $\cos^{-1} 20$ are not.

15. True. See Figure 3.6.2.

16. False. L'Hospital's Rule does not apply since $\lim\limits_{x\to\pi^-} \dfrac{\tan x}{1-\cos x} = \dfrac{0}{2} = 0$.