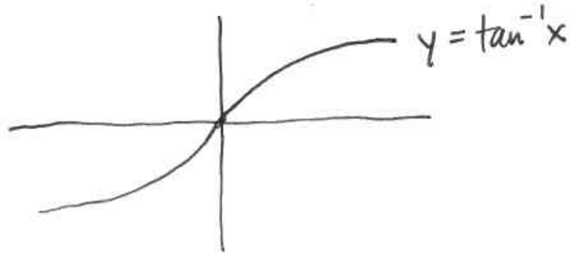
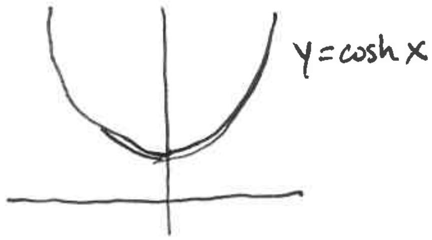
1. (a)



Passes horiz. line test for all x : one to one

(b)

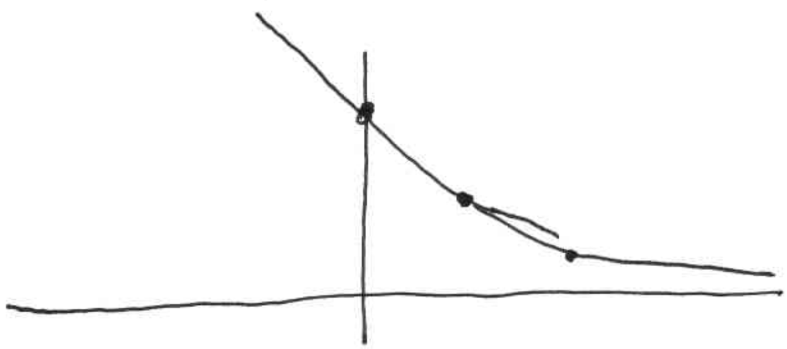


Fails H.L.T. for all $y>1$: not one to one

2. (a) $\log_6(72) - \log_6(2) = \log_6\left(\frac{72}{2}\right) = \log_6(36) = \log_6(6^2) = 2$

(b) $\cos^{-1}\left(\cos\left(-\frac{\pi}{4}\right)\right) = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right) = \frac{\pi}{4}$

3. $y = 2^{1-x}$ $\quad x=1, y=1 \quad x=0, y=2 \quad x=2, y=\frac{1}{2}$



4. $y = x^{\sinh x} \Rightarrow \ln y = \sinh x(\ln x)$

$\Rightarrow \frac{y'}{y} = (\cosh x)(\ln x) + (\sinh x)\left(\frac{1}{x}\right)$

$\Rightarrow y' = x^{\sinh x}\left[(\cosh x)(\ln x) + \frac{\sinh x}{x}\right]$

5. (a) $\lim_{x\to 0} \dfrac{x^2}{\cos(x)-1} \quad \left(\dfrac{0}{0}\right) \overset{L'H}{=} \lim_{x\to 0} \dfrac{2x}{-\sin x} \quad \left(\dfrac{0}{0}\right)$

$\overset{L'H}{=} \lim_{x\to 0} \dfrac{2}{-\cos x} = -2$

(b) As $x \to 2^+$, $x-2 \to 0^-$ and $1/(x-2) \to -\infty$.

So $\lim_{x\to 2^+} 10^{1/(x-2)} \to 10^{-\infty} \Rightarrow 0$

6. (a) $\int x e^{-2x^2}\,dx = \int x e^u \left(\dfrac{du}{-4x}\right) = -\dfrac{1}{4}\int e^u\,du$

$\left[\begin{array}{l} u = -2x^2 \\ du = -4x\,dx \end{array}\right]$

$= -\dfrac{1}{4} e^{-2x^2} + C$

(b) $\displaystyle\int_0^{\pi/2} \frac{\cos x}{1+\sin^2 x}\,dx = \int_0^1 \frac{du}{1+u^2}$

$\left[\begin{array}{l} u = \sin x \\ du = \cos x\,dx \end{array}\right]$

$= \left[\tan^{-1} u\right]_0^1 = \dfrac{\pi}{4} - 0 = \dfrac{\pi}{4}$