8.) $g(x) = \sin x \quad \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

$f'\left(-\frac{1}{2}\right) = \frac{2}{\sqrt{3}}$

$-\frac{1}{2} = \sin x$

$-\frac{\pi}{6} = x$

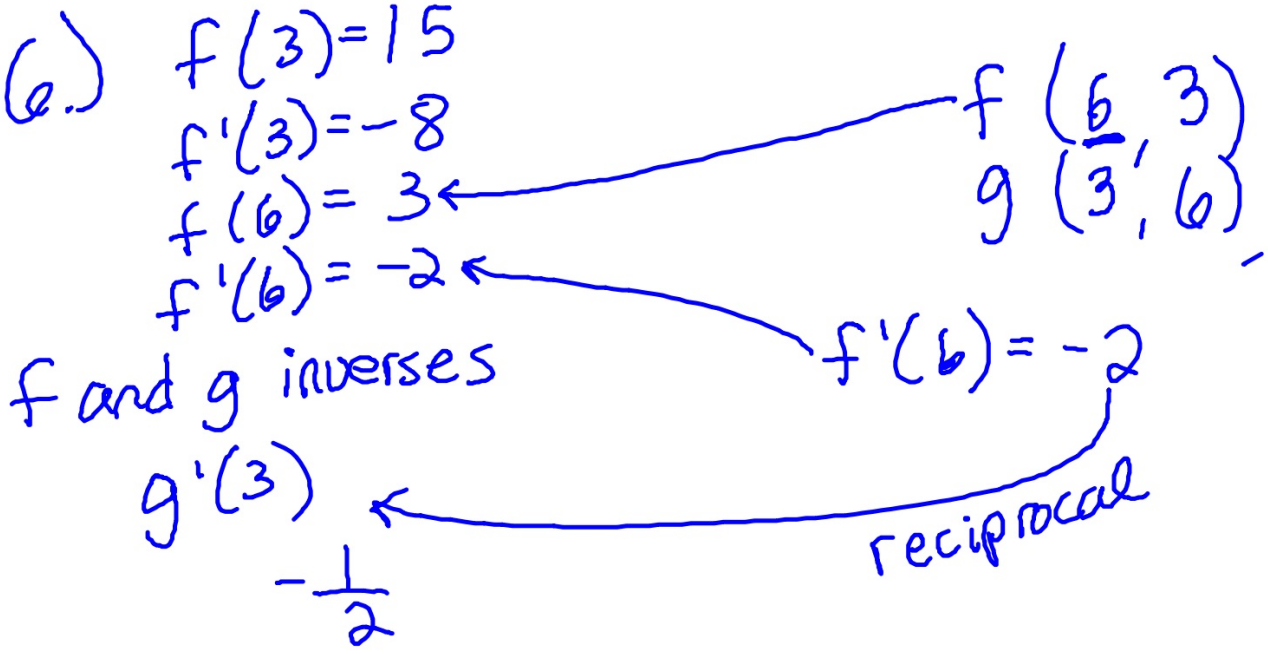
$g'(x) = \cos x$

$g'\left(-\frac{\pi}{6}\right) = \cos\left(-\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$

reciprocal

$f : \left(-\frac{1}{2}, -\frac{\pi}{6}\right)$

$g : \left(-\frac{\pi}{6}, -\frac{1}{2}\right)$


(6.)
f(3)=15
f'(3)=-8
f(6)=3
f'(6)=-2
f and g inverses
g'(3)
-1/2
f(6,3)
g(3,6)
f'(6)=-2
reciprocal

7.) $g(t) = 5t^2 - 10t + 4 \quad t \geq 1$

$4 = 5t^2 - 10t + 4$

$g : (2, 4)$

$g^{-1} : (4, 2)$

$g'(t) = 10t - 10$

$g'(2) = 10$

$(g^{-1})'(4) = \frac{1}{10}$

5.) $f(x) = 2x^3 - 3x \quad x \geq 0 \quad h'(-1)$

$-1 = 2x^3 - 3x$

$x = 1$

$h: (-1, 1)$

$f: (1, -1)$

$f'(x) = 6x^2 - 3$

$f'(1) = 3$ → reciprocal → $\frac{1}{3}$

$$y = \sqrt[3]{x^2+1}$$

$$y = (x^2+1)^{-2/3}$$

$$y' = \frac{1}{3}(x^2+1)^{-2/3} \cdot 2x$$

$$y' = \frac{2x}{3(x^2+1)^{2/3}}$$

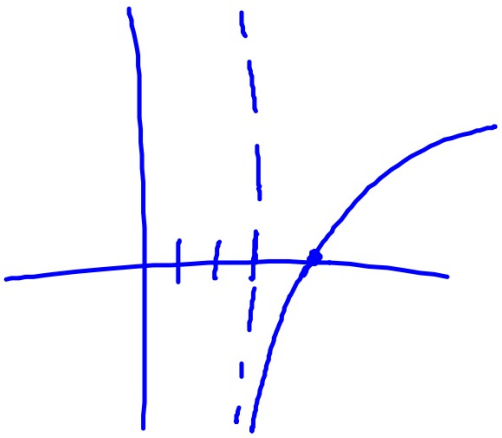
$$y'(1) = \frac{2}{3 \cdot 2^{2/3}}$$

$$32^{2/5}$$

$$(2^5)^{2/5}$$

$$4$$

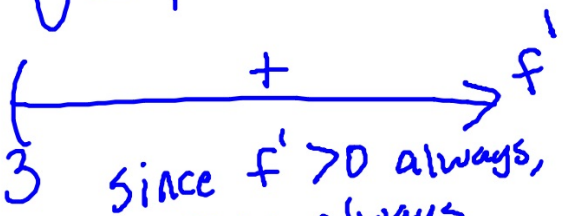
45.) $f(x) = \ln(x-3)$



$f'(x) = \frac{1}{x-3}$

$0 = \frac{1}{x-3}$

$0 = 1$



since $f' > 0$ always, $f(x)$ is always increasing, $f(x)$ is monotonic