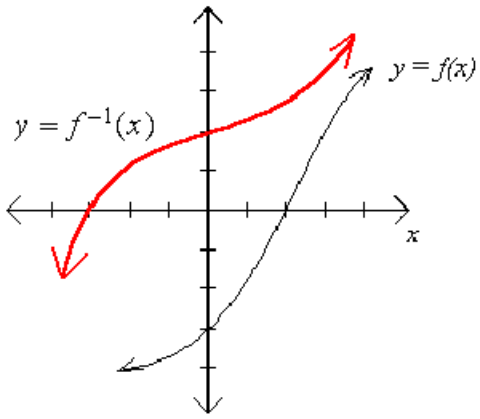
Math 152 Quiz 5 Name: KEY

1. Let $f(x)$ be the function drawn below. Sketch $f^{-1}(x)$ on the same axes.



2. Let $f(x) = 2x^3 + 3x - 2$ and $g = f^{-1}$.

   (a) Explain why $g(3) = 1$?

   Since $f(1) = 2(1)^3 + 3(1) - 2 = 3$, $f^{-1}(3) = 1$.

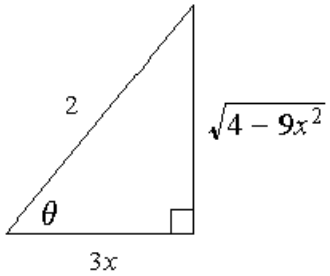
   (b) Find $g'(3)$.

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

$$\begin{aligned} g'(3) &= \frac{1}{f'(g(3))} \\ &= \frac{1}{f'(1)} \\ &= \frac{1}{6(1)^2 + 3} \\ &= \frac{1}{9} \end{aligned}$$

3. Simplify the expression $\tan\left(\cos^{-1}\left(\frac{3x}{2}\right)\right)$ so that no trigonometric or inverse trigonometric functions remain.

$$\begin{aligned} \text{Let } \theta &= \cos^{-1}\left(\frac{3x}{2}\right) \\ \cos\theta &= \frac{3x}{2} \end{aligned}$$



$$\begin{aligned}\tan\left(\cos^{-1}\left(\frac{3x}{2}\right)\right) &= \tan\theta \\ &= \frac{\sqrt{4-9x^2}}{3x}\end{aligned}$$