

Present neatly on separate paper. Justify for full credit. No Calculators.

Name _____ Score _____ ~20 minutes

1. Find the domain of $f(x) = \sqrt{5-x} + \frac{1}{\sqrt{x-3}}$.

Domain: $(-\infty, 5]$ and $(3, \infty)$, which results in $(3, 5]$

2. Complete the following table:

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	0	-1	2	1	3	-2	-3	4	-4
$g(x)$	3	2	1	-3	-1	-4	4	-2	0
$(f \circ g)(x)$									
$(g \circ f)(x)$									

$f(g(-4)) = f(3) = 4$
 $f(g(-3)) = f(2) = -3$
 ... etc.

$$f(x) = 8x^3 - 1$$

$$y = 8x^3 - 1$$

$$x = 8y^3 - 1$$

$$\frac{x+1}{8} = y^3$$

3. Find the inverse $f^{-1}(x)$ or explain why it does not exist.

$$f(x) = 8x^3 - 1.$$



4. State, in plain English, the Horizontal and Vertical Line Tests.

Illustrate their use with two brief examples.

$$f^{-1}(x) = \left(\frac{x+1}{8} \right)^{\frac{1}{3}}$$

The vertical line test is to check if a relation is a function.

The horizontal line test is used to test whether the inverse of a function is also a function. If $f(x)$ is 1-1 (i.e. it passes the horizontal line test), then its inverse will pass the vertical line test, and hence it is also a function.