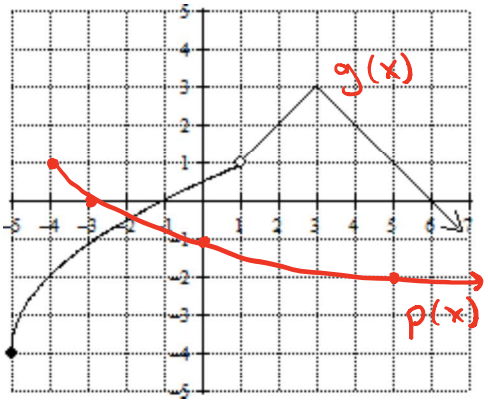
Free Response Practice #4
Calculator NOT Permitted

Pictured to the right is the graph of a piece-wise defined function, $g(x)$, that consists of a piece of a square root function and a piece of an absolute value function. Also, the function $p(x)$ is defined by the equation $p(x) = -\sqrt{x+4}+1$.



a. State the domain and range of the function $g(x)$.

Domain: $[-5, 1) \cup (1, \infty)$

Range: $(-\infty, 3)$

b. State how the graph of the function $p(x)$ would be different from the graph of $y = \sqrt{x}$. Then, graph $p(x)$ on the same grid as $g(x)$ using a minimum of 4 points plotted on the graph.

Compared to $y = \sqrt{x}$, the graph of $p(x)$ has a vertical reflection and is translated left 4 and up 1.

c. State what would be graphically true if $p(x) = g(x)$. Then, state for how many x – values $p(x) = g(x)$.

If $p(x) = g(x)$, then the graphs of $p(x)$ and $g(x)$ intersect.
$p(x) = g(x)$ at 2 different x-values.

d. Find the value of $3[p(12) - 2g(4)g(-5)]$. Either show your work or explain how you determined the values of $p(12)$, $g(4)$ and $g(-5)$.

$p(12) = -\sqrt{(12)+4}+1$
$= -\sqrt{16}+1$
$= -4+1$
$p(12) = -3$

On the graph of $g(x)$, when $x = 4$, $y = 2$ and when $x = -5$, $y = -4$

$3[p(12) - 2g(4) \cdot g(-5)]$
$= 3[(-3) - 2(2)(-4)]$
$= 3[-3+16]$
$= 3[13]$
$= 39$

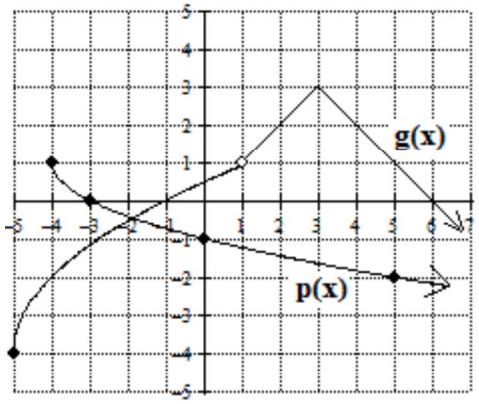
Free Response Practice #4 Grading Rubric

Free Response Part A – 2 points total

_____ 1 Correct domain: $[-5,1)\cup(1,\infty)$

_____ 1 Correct range: $(-\infty,3]$

Free Response Part B – 2 points total



_____ 1 The graph of $p(x)$ is the graph of $y=\sqrt{x}$ reflected over the $x-$axis, horizontally shifted to the left 4 units, and vertically shifted up 1 unit.

_____ 1 Correctly graphed $p(x)$ with the points (−4, 1), (−3, 0) (0, −1) and (5, −2) plotted.

Free Response Part C – 2 points total

_____ 1 If $p(x) = g(x)$, then the graphs of $p(x)$ and $g(x)$ are intersecting each other.

_____ 1 The graphs of $p(x)$ and $g(x)$ intersect at 2 different values of x.

Free Response Part D – 3 points total

_____ 1 Correctly finds the value of $p(12)$: $p(12)=-\sqrt{12+4}+1=-\sqrt{16}+1=-4+1=-3$

_____ 1 $g(4) = 2$ and $g(-5) = -4$ because the points (4, 2) and (−5, −4) are points on the graph of $g(x)$.

_____ 1 Correctly finds the value of $3[p(12)-2g(4)g(-5)]$ $= 3[-3-2(2)(-4)]$
$= 3[-3+16]$
$= 3[13]$
$= 39$