Functions Quiz

Level 1 – 2

1. If $f(x) = 3x + 1$ determine the following values.

   a) $f(0)$ ....

   b) $f(-3)$ ....

   c) $f(2)$ ....

2. If $h(x) = \frac{x+3}{2-x}$ determine the following values.

   a) $h(1)$ ....

   b) $h(3)$ ....

   c) $h(-2)$ ....

3. If $g(x) = \sqrt{x-3}$ determine the following values.

   a) $g(3)$ ....

   b) $g(4)$ ....

   c) $g(19)$ ....

4. If $f(x) = 3x + 1$ and $y = f(x)$ determine the values of x for the following values of y.

   a) 10 ....

   b) -5 ....

   c) 1 ....

5. If $f(x) = 5 - x$ and $y = f(x)$ determine the values of x for the following values of y.

   a) 4 ....

   b) -1 ....

   c) 5 ....

Level 3 – 4

6. If $f(x) = x^2 - x - 5$ solve the equation $f(x) = 1$.

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7. If $g(x) = x^2$ determine the following functions. Expand and simplify your answers where possible.

a) $g(x + 2)$ ....

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b) $g(3x)$ ....

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c) $g(-x)$ ....

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8. If $f(x) = x^2 + 2x$ determine the function $(f \circ g)(x)$ for the various functions $g(x)$. Expand and simplify your answers where possible.

a) $g(x) = x - 1$ ....

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b) $g(x) = 3x$ ....

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c) $g(x) = -2x$ ....

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9. Determine the function $f(x)$. Expand and simplify your answer.

a) $f\left(\dfrac{x-1}{2}\right) = x^2$

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b) $f(3 - 2x) = 4x + 1$

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10. The following table shows the values of the functions $f(x)$ and $g(x)$ for various values of x.

x	1	2	3	4	5
$f(x)$	4	2	5	1	3
$g(x)$	3	1	5	2	4

Solve the following:

a) $f(x) = 3$ ....

b) $g(x) = 2$ ....

c) $g(x) = f(x)$ ....

d) $(f \circ g)(x) = 3$ ....

e) $(g \circ f)(x) = 2$ ....

f) $f(x) = x$ ....

11. If $f(x) = x^2$ and $g(x) = 2x + 1$ solve the equation $f(x + 1) = g(x + 2)$.

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12. Let $f(x) = \frac{x}{x+1}$ and

$$f^1(x) = f(x)$$

$$f^2(x) = f(f(x))$$

$$f^3(x) = f(f(f(x)))$$

etc.

a) Determine the following functions. Simplify your answers.

i) $f^2(x)$ ....

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ii) $f^3(x)$ ....

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b) Based on your results to part a) write down what you would expect the function $f^k(x)$ to be, where $k \in \mathbb{Z}^+$.

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c) Assume your answer to part b) is true. *Use this answer* to determine the function $f^{k+1}(x)$, where $k \in \mathbb{Z}^+$. Simplify your answer.

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d) Use parts a), b) and c) to explain why your answer to part b) must definitely be true.

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13. Consider the function $y = 2x + 1$. If we swap the positions of the x and y we have $x = 2y + 1$. Rearranging this equation we have $y = \frac{x-1}{2}$.

a) If $f(x) = 2x + 1$ determine $f\left(\frac{x-1}{2}\right)$. Simplify your answer.

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b) If $f\left(\frac{x}{x+1}\right) = \frac{1}{x-1}$ determine $f(x)$. Simplify your answer.

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14. If $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x^2 - 4}$ determine the values of x for which the function $(f \circ g)(x)$ is undefined.

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