**Homework: Complete Worksheet + pg 35 # 1ace, 2a, 3, 4ace, 5ace, 8, 9af, 10ab, 11, 13, (15)**

**Review Grade 11 – Part 1: Transformation of Functions**

If f(x) represents some parent function, transformations can be used to create a new function:

 $y = af[k\left(x-d\right)]+c$

The graph of this new function will have similarities to the original parent function f(x), but each point will have been transformed as a result of the constants k, d, a, and c. The effect of each of these constants is the following:

k --> horizontally expands/compresses by a factor of . If 'k' is negative then the point is subsequently reflected about the y-axis.

d --> horizontally shifts the point 'd' units to the right.

a --> vertically expands/compresses by a factor of |a|. If 'a' is negative, then the point is subsequently reflected about the x-axis.

c --> vertically shifts the point up 'c' units.

\*\*\*A few key things to note\*\*\*

* Constants that are inside the function (k and d) transform the function horizontally; the effect of these constants is opposite of our intuition.
* Constants that are outside the function (a and c) transform the function vertically.
* Constants that operate as multipliers (k and a) represent expansion/compressions.
* Constants that operate as addition or subtraction (d and c) represent shifts.

**Example 1**

Describe the transformations in order for the following functions.

a) y = -4f(-0.5(x - 1)) + 3 b) Given the parent function,

 

|  |  |
| --- | --- |
| **Constant** | **Transformation** |
| **k =**  |  |
| **d =**  |  |
| **a =**  |  |
| **c =**  |  |

|  |  |
| --- | --- |
| **Constant** | **Transformation** |
| **k =** |  |
| **d =** |  |
| **a =**  |  |
| **c =** |  |

**Example 2**

Give the following table of values for parent functions create a graph of the transformed function and state the domain and range.

|  |  |
| --- | --- |
| **x** |  |
| **-2** | **2** |
| **-1** | **1** |
| **0** | **0** |
| **1** | **1** |
| **2** | **2** |

|  |  |
| --- | --- |
| **x** |  |
| **0** | **0** |
| **1** | **1** |
| **4** | **2** |
| **9** | **3** |

**a)  b) **

**y**

**x**

**y**

**x**

**k = k =**

**d = d =**

**a = a =**

**c = c =**

**Domain: Range: Domain: Range:**

**Mapping Function**

Another way to transform a function is to use a mapping statement as follows:

 Parent function Transformed Function

 (x, y) --------> 

**Example 3**

Create a mapping function and use it to recreate the graphs above.

 **a)  (x, y) --> b)  (x, y) -->**

**y**

**x**

**y**

**x**

**k = k =**

**d = d =**

**a = a =**

**c = c =**

**Practice**

Given a table of values for the following parent functions, graph the following and state the domain and range:

   

|  |  |
| --- | --- |
| x | y |
| -2 | -0.5 |
| -1 | -1 |
| 0 | DNE |
| 1 | 1 |
| 2 | 0.5 |

|  |  |
| --- | --- |
| x | y |
| 0 | 0 |
| 1 | 1 |
| 4 | 2 |
| 9 | 3 |

|  |  |
| --- | --- |
| x | y |
| -2 | 2 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |

a) **** b) ****

**y**

**x**

**y**

**x**

k = k =

d = d =

a = a =

c = c =

Domain: Range: Domain: Range:

c) **** d) ****

**y**

**x**

**y**

**x**

k = k =

d = d =

a = a =

c = c =

Domain: Range: Domain: Range: