**PreCalculus - Unit 1 Functions and Their Graphs**

**Study Note**

 Lines

* Point-Slope Equation y-y1 = m(x – x1)
* Parallel lines have the same slope
* Perpendicular lines have negative reciprocal slopes

Functions

* In a function there is only one possible output for any input
* Graphed functions must pass the vertical line test
* Utilize function notation that is y = f(x)
* Piece wise functions are defined for given domains
* Step function, is a series of horizontal lines
* Greatest integer functions
* Even functions, symmetrical with respect to y-axis; f(-x) = f(x)
* Odd functions, symmetrical with respect to the origin; f(-x) = -f(x)
* Know all basic functions, including cubic, roots, and absolute value

Transformations

* Vertical shift; Replace x with x – h, where h is the distance moved to the right
* Horizontal shift; Replace y with y – k, where k is the distance moved up
* Reflection across x-axis h(x) = -f(x)
* Reflection across y-axis h(x) = f(-x)
* Stretch and shrink; replace x with x/a, a>1 is a horizontal stretch
* Replace y with y/c, c>1 is a vertical stretch, shrink if 0 < c < 1

Combination of Functions

* Arithmetic of functions; sum, difference, product and quotient
* Composition of functions f(g(x)), output of one function is the input to another function

Inverse Functions

* Inverse functions undo the original function to end with what was started with
* Find inverse functions by solving for x, then changing the variables x, and y
* Find inverse function graphically, by reflecting a function over the line y=x
* Only one-to-one functions can have inverses

Linear Models

* Scatter plots are x and y coordinates graphed as points on a graph
* Correlation demonstrates that data output generally reflects some trend
* Regression lines are mathematical approximations to data
* Best fit lines are the statistically best mathematical approximations