|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Topic 2: Functions and Equations | | | | | | | | | | | | *Polynomials* | | | | | | | | | | |
| The Remainder Theorem states: | | | | | | | | | | | | The Factor Theorem states: | | | | | | | | | | |
| If a polynomial is divided by , then | | | | | | | | | | | | A polynomial has a factor if and only if : | | | | | | | | | | |
| Polynomial function: Factors, Roots, Zeros | | | | Factors are: and | | | | | The line of symmetry of is:  This can also be used to find turning point of quadratic by plugging | | | | | | | | | | | | | |
| Zeros are: and | | | | |
| X-Intercepts are at: or | | | | | The number of solutions of a quadratic equation depends on the value of the discriminant: | | | | | | | | |  | | | | |
| Roots/Solutions are: or | | | | | *2 Real distinct solutions* | | | *One Real Solution* | *No real solutions* |
| Topic 2: Functions and Equations | | | | | | | | | | | | | *The Theory of Functions* | | | | | | | | | |
| Function: A set of ordered pairs in which every x-value has a unique y-value. | | | | | | | | | | | | | | | | | | | | | | |
| In order to be a function, the graph of an equation must pass the vertical and horizontal line test | | | | | | | | | | | | | | | | | | | | | | |
| The Vertical Line Test States: | | | | | | A relation is a function if a vertical line intersects the graph of a relation at only one point, | | | | | | | | | | | | | | | | |
| The Horizontal Line Test States: | | | | | | | A function is a one-to-one function if a horizontal line crosses the graph once  Otherwise, it is a many-to-one function | | | | | | | | | | | | | | | |
| Rationale Functions are a ratio of two polynomials: | | | Asymptote & intercepts of a rational function: | | | | | Vertical Asymptote: *(where is impossible, thus )* | | | | | | | | | | | | | | |
| Horizontal Asymptote: | |  | | | | | | | | | | *(substitute for )* | | |
|  | | | | | | | | | |  | | |
|  | | | | | | | | | |  | | |
|  | | | X-intercept: *(where )* | | | | | | | | | | | | | | |
| Y-intercept: *(where)* | | | | | | | | | | | | | | |
| Interval Notation | | | | | Set Builder Notation | | | | | A function is odd when: | | | | | | | | | | | | |
|  | | | | |  | | | | | A function is even when: | | | | | | | | | | | | |
| Inverse functions: | | | | | | | | | Reflection of on the line | | | |
| Swaps domain and range of | | | |
|  | | | |
| Topic 2: Functions and Equations | | | | | | | | | | | *Transformations of Graphs* | | | | | | | | | | | |
| Shifts | | shifts to the right by units | | | | | | | | | | | | | | | | | | | | |
| shifts to the left by units | | | | | | | | | | | | | | | | | | | | |
| shifts up by units | | | | | | | | | | | | | | | | | | | | |
| shifts down by units | | | | | | | | | | | | | | | | | | | | |
| Reflections | | reflects across the y-axis | | | | | | | | | | | | | | | | | | | | |
| reflects across the x-axis | | | | | | | | | | | | | | | | | | | | |
| Stretches | | If, transformation is a stretch | | | | | | | | | | | | | If , transformation is a compress | | | | | | | |
| stretches/compresses horizontally, by | | | | | | | | | | | | | | | | | | | | |
| stretches/compresses vertically, by | | | | | | | | | | | | | | | | | | | | |
| Modulus | |  | | | | | | | | | | | | | Turns all x values positive | | | | | | | |
|  | | | | | | | | | | | | | Reflects the graph to the right of the y-axis in the y-axis  Ignore the left hand side part of the graph | | | | | | | |
|  | Zeros of (when they exist) are the vertical asymptotes of | | | | | | | | | | | | | | | | Zeros of are the vertical asymptotes of | | | | | |
| If the y-intercept of, then is the y-intercept of | | | | | | | | | | | | | | | | | | | | | |
| The minimum value of is the maximum of | | | | | | | | | | | | | | | The minimum value of is the maximum of | | | | | | |
| When , | | | | | | | | | | | | | When , | | | | | | | | |
| When approaches 0, will approach | | | | | | | | | | | | | When approaches , approaches 0 | | | | | | | | |