**Applications of Integration – Formula Sheet:**

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| **Area under the Curve:** | **Antiderivatives:** |
| **Summation Formulas:** | **Rectilinear Motion:** |
| **Summation Formulas:** | **Definition of the Definite Integral:** |
| **Summation Formulas:** | **Evaluating Definite Integrals:** |
| **Area – Riemann Sums: (Left, Right, & Midpoint)** | **Properties of Definite Integrals:** |

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| **Area – Trapezoidal Rule:** (Approximate Integration) | |
| **Area – Simpson’s Rule:** (Approximate Integration) | |
| **Error Bounds** – Trapezoidal & Midpoint: | **Error Bounds** – Simpson’s Rule: |
| **Integral of Even Functions:**  **Integral of Odd Functions:** | **Fundamental Theorem of Calculus** – Part 1:  If f(x) is continuous on the interval [a, b], then g(x) is continuous on the closed interval [a, b] and differentiable on the open interval (a, b). |
| **Natural Log defined as an integral:** | **Fundamental Theorem of Calculus** – Part 2: |
| **U-Substitution:** | **Net Change Theorem:** |

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| **Area Between Curves:** | **Area Between Curves:** |
| **Disk Method:** | **Disk Method:** |
| **Washer Method:** | **Washer Method:** |
| **Shell Method:** | **Shell Method:** |
| **Improper Integrals:** | **Volume by Cross Sections:** |

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| **Work done by a Force:**  **Note:**  F(x) is a function of force with respect to position. | **Arc Length:** |
| **Gravitational Force:**  **Restoring Force of Springs – Hooke’s Law:** | **Area of a Surface of Revolution:** |
| **Work required to pump water out of a tank:**  **Density of Water:** | **Area of a Surface of Revolution:** |
| **Work done by an expanding gas:** | **Average Value of a function:** |
| **Mean Value Theorem for Integrals:** | **Mean Value Theorem for Integrals:** |

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|  | **Moment around the x-axis:**  **Moment around the y-axis:** |
| **Center of Mass:** | **Coordinates of the Center of Mass:** |
| **Centroid:** | **Coordinates of the Center of Mass:** |
| **Mass of the Plate:**  **Area of the Plate / Laminar:**  **Surface Density:** | **Moment of the system around the x-axis:**  **Moment of the system around the y-axis:**  **Linear Density:** *(Not used in the formulas above)* |

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| **Hydrostatic Force:** | **Hydrostatic Force:**  **Weight Density:**  **Normal Density:**  **Note:** |
|  | **Probability Density Functions:** |
| **Probability Density Functions:**  **The Mean:**  **The Median:** | **Probability of Exponential Distributions:** |

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| **Probability of a Normal Distribution:** | **Probability of a Normal Distribution:** |