Asymptote: A vertical or horizontal line on a graph which a function approaches.

Antiderivative: The antiderivative of a function $f(x)$ is another function $F(x)$. If we take the derivative of $F(x)$ the result is $f(x)$. The most general antiderivative is a family of curves.

Antidifferentiation: The process of finding an antiderivative of a function $f(x)$.

Concavity: Concavity measures how a function *bends*, or in other words, the function's curvature.

Concave Down: A function $f(x)$ is concave down at $x = a$ if it is below its tangent line at $x = a$. This is true if $f''(a) < 0$.

Concave Up: A function $f(x)$ is concave up at $x = a$ if it is above its tangent line at $x = a$. This is true if $f''(a) > 0$.

Constant of Integration: The constant that is included when an indefinite integral is performed.

Definite Integral: Formally, a definite integral looks like $\int_a^b f(x)\,dx$. A definite integral when evaluated yields a number. The definite integral can be interpreted as the net area under the function $f(x)$ from $x = a$ to $x = b$.

Derivative: Formally, a derivative looks like $\frac{d}{dx}f(x)$, and represents the rate of change of $f(x)$ with respect to the variable x. Anther notation for derivative is $f'(x)$.

Differential: Informally, a differential dx can be thought of a small amount of x. Differentials appear in both derivatives and integrals.

Differentiation: The process of finding the derivative of a function $f(x)$.

Displacement: How far a particle has moved during a time interval from t_1 to t_2. If $v(t)$ is the velocity, the displacement is given by $\int_{t_1}^{t_2} v(t)\,dt$.

Distance Traveled: The total distance a particle has moved during a time interval from t_1 to t_2. Since this can include doubling back, this will be larger than or equal to the displacement, and will always be a non-negative quantity. If $v(t)$ is the velocity, the distance traveled is given by $\int_{t_1}^{t_2} |v(t)|\,dt$.

Extrema: Any of the maximum or minimum values for a function.

Family of Curves: A family of curves involves a constant, usually something like $g(x) + C$ (although other forms are possible), and when you assign different values to the constant C you get different members of the family of curves.

Fundamental Theorem of Calculus: The Fundamental Theorem of Calculus (FTC) explains the relationship between differentiation and integration. Essentially, differentiation and integration are inverse operations. There are two parts to the FTC, Part 1 is where integration is performed first and then differentiation, and Part 2 is where differentiation is first followed by integration.

Part 1: $\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$ Part 2: $\int_a^b \frac{d}{dx}[g(x)]\,dx = g(b) - g(a)$

Horizontal Asymptote: If $\lim_{x\to\pm\infty} f(x) = L$, then $y = L$ is a horizontal asymptote of $f(x)$.

Indeterminant Form: A form that represents a number (or possibly is infinite) which cannot be determined without more mathematical invesitgation. Common indeterminant forms include $\frac{0}{0}, \frac{\infty}{\infty}, 1^{\infty}$. Indeterminant forms arise when evaluating limits.

Improper Integral: Formally, an improper integral looks like $\int_a^b f(x)\,dx$ where the integrand $f(x)$ is infinite for some $x \in [a, b]$, or $a \to -\infty$ or $b \to \infty$. Evaluating these types of integrals is studied in Calculus II.

Indefinite Integral: Formally, an indefinite integral looks like $\int f(x)\,dx$. An indefinite integral when evaluated yields a family of curves as the solution, $\int f(x)\,dx = F(x)+C$, where $F(x)+C$ is the most general antiderivative of the integrand.

Integral: Used as a way to refer to any of the specific types of integrals (definite, indefinite, or improper integral).

Integrand: The quantity being integrated. For $\int_a^b f(x)\,dx$, the integrand is $f(x)$.

Integration: The process of evaluating an integral (definite, indefinite, or improper) of a function $f(x)$.

Limits of Integration: For a definite integral, $\int_a^b f(x)\,dx$, the limits of integration are a (lower limit) and b (upper limit).

Net Area: When considering the area under a function $f(x)$ from $x = a$ to $x = b$, the area that is above the x-axis is considered positive, and the area below the x-axis is considered negative. The net area is the total area determined using this convention. The net area is sometimes referred to as the *signed area*. When definite integration is performed by finding an antiderivative of the integrand, the result is the net area.

Point of Inflection: A function $f(x)$ has a point of inflection at $x = a$ if the function changes concavity at $x = a$. This is possible if $f''(a) = 0$.

Riemann Sum: The general form of a Riemann sum is $\sum_{i=1}^{n} f(x_i^*)\frac{b-a}{n}$. The Riemann sum represents an approximation to the net area under a function $f(x)$ from $x = a$ to $x = b$. The approximation uses n rectangles to approximate the area.

Vertical Asymptote: If $\lim_{x\to a} f(x) = \pm\infty$, then $x = a$ is a vertical asymptote of $f(x)$.