1. **Attenuation: n, uncountable**

· **ADJ + attenuation:**

* Signal / optical / temporal / frequency-dependent / differential / exponential / linear / selective / gradual / phase

· **Attenuation + NOUN:**

* Loss / factor / coefficient / curve / range / process

· **VERB + attenuation:**

* Measure / calculate / mitigate / assess

· **Phrases:**

* ~ of signals / ~ in transmission / ~ through mediums

| **ADJ + attenuation** | **Definition** | **Example** |
| --- | --- | --- |
| Signal attenuation | The reduction in signal strength as it travels through a medium. | Signal attenuation is a critical factor in designing communication systems to ensure reliable data transmission. |
| Optical attenuation | The loss of signal strength in optical fibers due to scattering and absorption. | Optical attenuation can significantly impact the performance of long-distance fiber optic communications. |

| **attenuation + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Attenuation factor | A ratio that quantifies the reduction in signal strength as it passes through a medium. | The attenuation factor helps engineers determine how much power is needed for effective signal transmission. |
| Attenuation curve | A graphical representation showing how signal strength decreases over distance or frequency. | The attenuation curve provides insights into how different frequencies are affected during transmission. |

| **VERB + attenuation** | **Definition** | **Example** |
| --- | --- | --- |
| Measure attenuation | To determine the amount of signal loss in a given medium. | Engineers must measure attenuation to assess the quality of communication links. |
| Mitigate attenuation | To reduce or minimize the effects of signal loss during transmission. | Various techniques can be implemented to mitigate attenuation in wireless communication systems. |

1. **Transmission: n, uncountable**

· **ADJ + transmission:**

* Digital / analog / wireless / synchronous / asynchronous / high-frequency / low-latency / robust / continuous / intermittent

· **transmission + NOUN:**

* Medium / rate / line / power / protocol / error

· **VERB + transmission:**

* Ensure / optimize / facilitate / control

· **Phrases:**

* ~ of data / ~ over networks / ~ in telecommunications

| **ADJ + transmission** | **Definition** | **Example** |
| --- | --- | --- |
| Digital transmission | The transfer of data using digital signals as opposed to analog signals. | Digital transmission has revolutionized how data is processed and communicated. |
| Low-latency transmission | A transmission method characterized by minimal delay in data delivery. | Low-latency transmission is critical for real-time applications such as online gaming. |

| **transmission + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Transmission medium | The physical path through which a signal travels from sender to receiver. | Optical fibers serve as an effective transmission medium for high-speed data transfer. |
| Transmission rate | The speed at which data is transmitted over a network or medium. | The transmission rate affects the overall performance and efficiency of communication systems. |

| **VERB + transmission** | **Definition** | **Example** |
| --- | --- | --- |
| Ensure transmission | To make certain that the data is successfully sent from one point to another. | Security protocols are implemented to ensure transmission integrity during data transfer. |
| Optimize transmission | To improve the efficiency and speed of data transfer over a network. | Engineers work to optimize transmission parameters for better performance in communication systems. |

1. **Sequential: adj**

· **ADJ + sequential:**

* Linear / non-linear / ordered / parallel / discrete / hierarchical / iterative / systematic / progressive / temporal

· **sequential + NOUN:**

* Processing / model / decision-making / data / execution / algorithms

· **Phrases:**

* ~ order of operations / ~ logic / ~ access

| **ADJ + sequential** | **Definition** | **Example** |
| --- | --- | --- |
| Linear sequential | A process where steps are executed in a straight, uninterrupted line. | The linear sequential model is often used in software development to ensure systematic progress. |
| Non-linear sequential | A process that allows for steps to be executed out of order or in a more complex arrangement. | Non-linear sequential processes are often used in advanced algorithms to optimize performance. |

| **sequential + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Sequential processing | A method of processing data where each operation is performed one after another. | Sequential processing can be less efficient than parallel processing in large datasets. |
| Sequential decision-making | A decision-making process that involves evaluating options in a specific order. | Sequential decision-making is crucial in algorithms that rely on prior outcomes to inform future choices. |

1. **Propagation: n, uncountable**

· **ADJ + propagation:**

* Spatial / temporal / electromagnetic / genetic / wave / iterative / exponential / circular / stable / chaotic

· **propagation + NOUN:**

* Loss / factor / coefficient / curve / range / process

· **VERB + propagation:**

* Measure / calculate / mitigate / assess

· **Phrases:**

* ~ of signals / ~ through media / ~ in networks / ~ back propagation

| **ADJ + propagation** | **Definition** | **Example** |
| --- | --- | --- |
| Spatial propagation | The spread of a signal or wave through space. | Spatial propagation of sound waves can vary significantly depending on the medium. |
| Back propagation | A supervised learning algorithm used in training artificial neural networks by calculating gradients for weight updates. | Back propagation is essential for minimizing the error in neural networks during the training process. |

| **propagation + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Propagation loss | The reduction in signal strength as it travels through a medium. | High levels of propagation loss can severely affect communication quality over long distances. |
| Propagation coefficient | A parameter that quantifies the attenuation or gain of a signal as it moves through a medium. | The propagation coefficient is vital for designing efficient communication systems. |

| **VERB + propagation** | **Definition** | **Example** |
| --- | --- | --- |
| Measure propagation | To determine the behavior and characteristics of signal spreading. | Engineers need to measure propagation to assess the quality of communication links. |
| Mitigate propagation | To reduce or minimize the effects of signal loss during transmission. | Various techniques can be implemented to mitigate propagation issues in wireless communication systems. |

1. **Convolutional: adj**

· **ADJ + convolutional:**

* Deep / spatial / temporal / multi-layered / hierarchical / recurrent / standard / dilated / separable / fully-connected

· **convolutional + NOUN:**

* Neural network / layer / operation / filter / kernel / architecture

· **Phrases:**

* ~ neural networks / ~ operations / ~ filters

| **ADJ + convolutional** | **Definition** | **Example** |
| --- | --- | --- |
| Deep convolutional | Referring to convolutional architectures with many layers for improved feature extraction. | Deep convolutional networks have shown remarkable performance in image classification tasks. |
| Spatial convolutional | A type of convolutional operation that focuses on spatial dimensions of input data. | Spatial convolutional layers are commonly used in image processing applications to capture local patterns. |

| **convolutional + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Convolutional neural network | A class of deep learning models specifically designed for processing structured grid data, such as images. | Convolutional neural networks have been revolutionary in the field of computer vision. |
| Convolutional layer | A layer in a neural network that applies convolution operations to the input data. | The convolutional layer extracts features from the input image before passing them to subsequent layers. |

1. **Convexity: n, uncountable**

· **ADJ + convexity:**

* Strong / weak / local / global / uniform / increasing / decreasing / strict / bounded / non-bounded

· **convexity + NOUN:**

* Measure / function / set / analysis / optimization / property

· **VERB + convexity:**

* Assess / demonstrate / establish / exploit

· **Phrases:**

* Convexity of functions / convexity in economics / convexity in optimization

| **ADJ + convexity** | **Definition** | **Example** |
| --- | --- | --- |
| Strong convexity | A property of a function where the line segment between any two points on the graph lies above the graph itself, indicating a unique minimum. | Strong convexity ensures that any local minimum is also a global minimum, simplifying optimization problems. |
| Local convexity | The property of a function being convex in a neighborhood around a particular point. | Local convexity is important for analyzing the behavior of functions near critical points. |

| **convexity + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Convexity measure | A quantitative assessment of the degree of convexity of a set or function. | The convexity measure helps in determining the efficiency of various optimization algorithms. |
| Convexity property | A characteristic of a set or function that describes its convex nature. | The convexity property is crucial in economics for ensuring efficient allocation of resources. |

| **VERB + convexity** | **Definition** | **Example** |
| --- | --- | --- |
| Assess convexity | To evaluate the convexity of a function or set to understand its implications. | Researchers often assess convexity to identify suitable optimization strategies. |
| Establish convexity | To prove or demonstrate that a function or set has convex properties. | Mathematicians establish convexity through rigorous proofs and visual representations. |

1. **Disseminate: v, transitive**

· **ADJ + discontinuity:**

* Sudden / sharp / significant / inherent / observable / mathematical / temporal / spatial / structural / functional

· **discontinuity + NOUN:**

* Point / function / interval / behavior / change / transition / surface

· **VERB + discontinuity:**

* Identify discontinuity / analyze discontinuity / experience discontinuity / model discontinuity

· **Phrases:**

* Discontinuity in data / discontinuity in function / discontinuity in system

| **ADJ + discontinuity** | **Definition** | **Example** |
| --- | --- | --- |
| Sudden discontinuity | An abrupt change or break in a function or process that can lead to significant effects. | The sudden discontinuity in the temperature readings indicated a potential malfunction in the sensor. |
| Observable discontinuity | A noticeable break or change in a system or dataset that can be detected through analysis. | The analysis revealed an observable discontinuity in the data during the transition period. |

| **discontinuity + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Discontinuity point | A specific location in a function or dataset where a sudden change occurs. | The discontinuity point in the graph marked where the function ceased to be continuous. |
| Discontinuity behavior | The way a system or function reacts or changes in response to a discontinuity. | The discontinuity behavior of the material under stress led to unexpected failure modes. |

| **VERB + discontinuity** | **Definition** | **Example** |
| --- | --- | --- |
| Identify discontinuity | To detect or determine the presence of a break or change in a system or function. | Researchers aim to identify discontinuity in the data to understand underlying trends. |
| Analyze discontinuity | To examine and interpret the nature and effects of a break or change in a system. | Engineers must analyze discontinuity in the structure to ensure its integrity and safety. |

1. **Penultimate: adj**

· **ADJ + penultimate:**

* Final / preceding / second-to-last / primary / significant / critical / necessary / immediate / theoretical / transitional

· **penultimate + NOUN:**

* Layer / moment / chapter / phase / step / interval

· **Phrases:**

* Penultimate layer / penultimate step / penultimate moment

| **ADJ + penultimate** | **Definition** | **Example** |
| --- | --- | --- |
| Transitional penultimate | Referring to the penultimate step or stage that serves as a bridge to the final phase. | The transitional penultimate layer is essential for integrating the different functions of the neural network. |
| Final penultimate | Indicating the last stage before the final element in a process. | The final penultimate evaluation was crucial before the project launch. |

| **penultimate + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Penultimate layer | The second-to-last layer in a multi-layered structure, often crucial for functionality. | The penultimate layer in the neural network helps refine feature extraction before the final decision-making layer. |
| Penultimate phase | The stage just before the final phase in a process or project. | During the penultimate phase of development, we focused on testing and quality assurance. |

1. **Independent: adj**

· **ADJ + independent:**

* Completely / statistically / conditionally / mutually / relatively / functionally / linearly / wholly / freely / uniformly

· **independent + NOUN:**

* Variables / sample / entity / relationship / system / process

· **VERB + independent:**

* Remain independent / consider independent / classify as independent / identify as independent

· **Phrases:**

* Independent variables / independent study / independent sample

| **ADJ + independent** | **Definition** | **Example** |
| --- | --- | --- |
| Statistically independent | Referring to random variables that do not influence each other’s probabilities or outcomes. | In a statistical analysis, the researchers assumed that the independent variables were statistically independent to simplify the model. |
| Completely independent | Free from any influence or correlation with other variables or factors. | The results showed that the two processes were completely independent, confirming the hypothesis. |

| **independent + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Independent variables | Variables in a statistical model that are manipulated or controlled to determine their effect on dependent variables. | In multiple regression analysis, researchers assess how independent variables affect the dependent variable. |
| Independent sample | A set of observations or data points that are not influenced by any other samples in the study. | The analysis was conducted using an independent sample to avoid biases in the results. |

| **VERB + independent** | **Definition** | **Example** |
| --- | --- | --- |
| Remain independent | To continue to exist or operate without dependence on others. | The organization strives to remain independent to maintain its integrity and objectivity. |

1. **Augment: v, transitive**

· **ADJ + augment:**

* Significantly / substantially / rapidly / gradually / dramatically / effectively / strategically / continuously / actively / minimally

· **augment + NOUN:**

* Data / resources / capabilities / performance / functionality / understanding

· **VERB + augment:**

* Aim to augment / seek to augment / intend to augment / use to augment

· **Phrases:**

* Augment reality / augment capabilities / augment data collection

| **ADJ + augment** | **Definition** | **Example** |
| --- | --- | --- |
| Significantly augment | To increase or enhance something to a large extent. | The new software update is designed to significantly augment the system's processing speed. |
| Strategically augment | To enhance or increase something with careful planning to achieve a specific goal. | The team decided to strategically augment their marketing efforts to reach a broader audience. |

| **augment + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Augment data | To enhance or improve the quality and quantity of data available for analysis. | Researchers often use machine learning techniques to augment data sets for better accuracy. |
| Augment resources | To increase the available resources to improve efficiency or output. | The company plans to augment its resources by hiring more staff and investing in new technology. |

| **VERB + augment** | **Definition** | **Example** |
| --- | --- | --- |
| Aim to augment | To have the goal of increasing or enhancing something. | The organization aims to augment its services to better meet the needs of the community. |
| Use to augment | To apply a method or tool to enhance or improve something. | They use advanced analytics to augment their understanding of customer behavior. |

1. **Evaluate:**

· **ADJ + evaluate:**

* Thoroughly / critically / systematically / effectively / accurately / continuously / rigorously / periodically / methodically / constructively

· **evaluate + NOUN:**

* Calculations / performance / results / data / options / methods / impact

· **Phrases:**

* Evaluate calculations / evaluate performance / evaluate options

| **ADJ + evaluate** | **Definition** | **Example** |
| --- | --- | --- |
| Thoroughly evaluate | To assess something in a comprehensive and detailed manner. | The committee was tasked to thoroughly evaluate the project's feasibility before moving forward. |
| Critically evaluate | To analyze and assess something with careful judgment and scrutiny. | The researchers needed to critically evaluate the results to ensure their validity. |

| **evaluate + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Evaluate calculations | To assess the accuracy and reliability of numerical computations or mathematical results. | It is essential to evaluate calculations before presenting the final report to ensure precision. |
| Evaluate performance | To assess how well someone or something is functioning or achieving goals. | The annual review is the time to evaluate employee performance against set objectives. |

1. **Antithetical: adj**

· **ADJ + antithetical:**

* Directly / inherently / fundamentally / conceptually / diametrically / completely / paradoxically / mutually / logically / strikingly

· **antithetical + NOUN:**

* Results / concepts / ideas / principles / values / positions / arguments

· **VERB + antithetical:**

* Be antithetical to / consider antithetical / present as antithetical / view as antithetical

· **Phrases:**

* Antithetical results / antithetical ideas / antithetical principles

| **ADJ + antithetical** | **Definition** | **Example** |
| --- | --- | --- |
| Directly antithetical | Referring to ideas or concepts that are in complete opposition to each other. | The two political parties have directly antithetical views on economic policy. |
| Fundamentally antithetical | Indicating a deep-rooted opposition between concepts or principles. | The philosophy of the two thinkers is fundamentally antithetical, leading to contrasting conclusions. |

| **antithetical + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Antithetical results | Outcomes from an experiment or study that are in direct opposition to each other, often highlighting contradictory findings. | The NN experiment yielded antithetical results, showing improved performance in one case and significant degradation in another. |
| Antithetical concepts | Ideas that are completely opposed or contradictory to one another. | The discussion highlighted the antithetical concepts of freedom and control. |

| **VERB + antithetical** | **Definition** | **Example** |
| --- | --- | --- |
| Be antithetical to smth | To exist in direct opposition to something. | The proposed policy was antithetical to the principles of social justice. |
| Consider antithetical | To regard something as being in conflict or contradiction with another. | Many consider the two approaches to be antithetical to each other in their methodologies. |

1. **Covariance: n, uncountable**

· **ADJ + covariance:**

* Positive / negative / conditional / joint / sample / total / empirical / structural / stationary / covariance-based

· **covariance + NOUN:**

* Matrix / estimation / analysis / function / calculation / model

· **VERB + covariance:**

* Calculate covariance / determine covariance / analyze covariance / estimate covariance

· **Phrases:**

* Covariance matrix / covariance analysis / covariance estimation

| **ADJ + covariance** | **Definition** | **Example** |
| --- | --- | --- |
| Positive covariance | A scenario where two variables move in the same direction, meaning that as one increases, the other tends to increase as well. | The positive covariance between height and weight suggests that taller individuals generally weigh more. |
| Conditional covariance | The covariance between two random variables given a specific condition or set of circumstances. | The study examined conditional covariance to understand the relationships under different economic scenarios. |

| **covariance + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Covariance matrix | A square matrix that contains the covariances between pairs of variables, used in statistics to understand the relationships among multiple variables. | In multivariate analysis, the covariance matrix is crucial for assessing the dependencies between different factors. |
| Covariance analysis | A statistical method used to assess the relationship between variables and how they change together. | Covariance analysis revealed important insights into how different factors influenced the study's outcomes. |

| **VERB + covariance** | **Definition** | **Example** |
| --- | --- | --- |
| Calculate covariance | To compute the value of relationship between two variables. | Researchers need to calculate covariance to understand the interaction between different economic indicators. |
| Analyze covariance | To examine the value of relationship among results | The team decided to analyze covariance to uncover patterns in the experimental data. |

1. **Heuristic: adj**

· **ADJ + heuristic:**

* Cognitive / iterative / empirical / problem-solving / analytical / exploratory / adaptive / practical / rule-based / simplification-based

· **heuristic + NOUN:**

* Approach / method / technique / analysis / evaluation / algorithm

· **VERB + heuristic:**

* Employ heuristic / develop heuristic / utilize heuristic / apply heuristic

· **Phrases:**

* Heuristic method / heuristic approach / heuristic evaluation

| **ADJ + heuristic** | **Definition** | **Example** |
| --- | --- | --- |
| Cognitive heuristic | A mental shortcut that allows individuals to make decisions and solve problems quickly and efficiently, often based on prior experiences. | Using cognitive heuristics, people often make quick judgments that may not always be rational. |
| Problem-solving heuristic | A strategy or technique used to simplify complex problems and find solutions. | The team applied a problem-solving heuristic to break down the project into manageable tasks. |

| **heuristic + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Heuristic method | A technique that employs practical approaches for problem-solving, often based on trial and error. | The heuristic method helped researchers quickly identify viable solutions to the issue. |
| Heuristic algorithm | An algorithm designed to solve problems faster than classical methods, typically by using approximation and rules of thumb. | The heuristic algorithm efficiently navigated the search space to find an optimal solution in a shorter time. |

| **VERB + heuristic** | **Definition** | **Example** |
| --- | --- | --- |
| Employ heuristic | To use a heuristic approach or technique to solve a problem or make a decision. | The developers decided to employ heuristic methods to enhance the software's performance. |
| Develop heuristic | To create new heuristic techniques or approaches for addressing specific challenges. | Researchers are working to develop heuristic strategies that improve decision-making processes in complex environments. |

1. **Kernel: n, countable**

· **ADJ + kernel:**

* Linear / Gaussian / polynomial / radial / compact / convolutional / operator / density / smoothing / feature

· **kernel + NOUN:**

* Function / method / estimator / algorithm / trick / space

· **VERB + kernel:**

* Define kernel / apply kernel / choose kernel / estimate kernel

· **Phrases:**

* Operator kernel / kernel function / kernel trick

| **ADJ + kernel** | **Definition** | **Example** |
| --- | --- | --- |
| Gaussian kernel | A type of kernel function that uses the Gaussian function, often employed in support vector machines and other machine learning algorithms. | The Gaussian kernel effectively captures the relationships between data points in the feature space. |
| Linear kernel | A kernel function that computes the inner product of two vectors, used in linear models for classification and regression. | The model used a linear kernel to separate the classes with a straight line in the feature space. |

| **kernel + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Operator kernel | A kernel that acts as a mapping function in various operations, particularly in functional analysis and machine learning. | The operator kernel is crucial for transforming the input data into a higher-dimensional space for better classification. |
| Kernel function | A function used in machine learning algorithms to enable operations in high-dimensional spaces without explicitly computing coordinates. | The choice of kernel function can significantly impact the performance of a support vector machine model. |

| **VERB + kernel** | **Definition** | **Example** |
| --- | --- | --- |
| Define kernel | To specify the mathematical properties and applications of a kernel function. | Researchers need to define the kernel appropriately to ensure accurate results in their analyses. |
| Apply kernel | To use a kernel function in computations or algorithms to process data. | In image processing, it is common to apply a kernel to blur or sharpen images. |

1. **Cache: n, countable**

· **ADJ + cache:**

* L1 / L2 / L3 / shared / private / write-through / write-back / non-blocking / instruction / data

· **cache + NOUN:**

* Line / memory / miss / coherence / hit / architecture

· **VERB + cache:**

* Access cache / manage cache / invalidate cache / clear cache

· **Phrases:**

* Cache line / cache memory / cache coherence

| **ADJ + cache** | **Definition** | **Example** |
| --- | --- | --- |
| L1 cache | The first level of cache memory located closest to the CPU, designed for high-speed data access. | The CPU uses L1 cache to store frequently accessed instructions for faster execution. |
| Write-back cache | A cache that allows data to be written to the cache only, deferring the update to the main memory until absolutely necessary. | Using a write-back cache improves performance by reducing the number of writes to the slower main memory. |

| **cache + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Cache line | A unit of data transferred between the CPU cache and the main memory, typically consisting of several bytes. | The cache line size can affect the performance of memory access patterns in a CPU. |
| Cache hit | An event where the data requested by the CPU is found in the cache, leading to faster access times. | Achieving a high cache hit rate is essential for improving overall system performance. |

| **VERB + cache** | **Definition** | **Example** |
| --- | --- | --- |
| Access cache | To retrieve data from the cache memory for processing. | The system will attempt to access the cache before looking in the slower main memory. |
| Invalidate cache | To clear or mark cache entries as outdated, forcing the system to retrieve fresh data. | When changes are made to the data, the system must invalidate the cache to ensure accuracy. |

1. **Regularization: n, uncountable**

· **ADJ + regularization:**

* L1 / L2 / elastic net / Bayesian / ridge / variational / structural / robust / penalized / stochastic

· **regularization + NOUN:**

* Technique / method / parameter / effect / term / approach

· **VERB + regularization:**

* Apply regularization / use regularization / involve regularization / enhance regularization

· **Phrases:**

* Regularization technique / regularization parameter / regularization effect

| **ADJ + regularization** | **Definition** | **Example** |
| --- | --- | --- |
| L1 regularization | A type of regularization that adds the absolute value of the coefficients as a penalty term to the loss function, encouraging sparsity in the model. | L1 regularization was applied to the linear model to reduce overfitting and improve interpretability. |
| Bayesian regularization | A method that incorporates prior knowledge into the regularization process, often leading to more robust models. | The researchers opted for Bayesian regularization to enhance the model's performance in uncertain environments. |

| **regularization + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Regularization technique | A strategy used to prevent overfitting by adding a penalty for larger coefficients in the model. | The choice of regularization technique can significantly impact the predictive power of the model. |
| Regularization parameter | A hyperparameter that controls the strength of the regularization applied to the model. | Tuning the regularization parameter is crucial for achieving the best balance between bias and variance. |

| **VERB + regularization** | **Definition** | **Example** |
| --- | --- | --- |
| Apply regularization | To incorporate regularization methods into a model to improve its generalization capability. | The team decided to apply regularization techniques to enhance the model's performance on unseen data. |
| Use regularization | To implement regularization methods to mitigate overfitting in machine learning models. | It is common to use regularization in regression models to stabilize the solution and improve prediction accuracy. |

1. **Differentiate: v, transitive**

· **ADJ + differentiate:**

* Easily / clearly / distinctly / significantly / systematically / mathematically / analytically / functionally / effectively / qualitatively

· **differentiate + NOUN:**

* Between / from / products / functions / variables / parameters / features

· **Phrases:**

* Differentiate between / differentiate from / differentiate functions

| **ADJ + differentiate** | **Definition** | **Example** |
| --- | --- | --- |
| Clearly differentiate | To establish a clear distinction between two or more elements. | The study aims to clearly differentiate between the effects of the two treatments on patient outcomes. |
| Mathematically differentiate | To compute the derivative of a function using mathematical principles. | Students learned how to mathematically differentiate polynomials to find their slopes. |

| **differentiate + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Differentiate between smth | To recognize or establish the differences between two or more items or concepts. | It is essential to differentiate between correlation and causation when analyzing data. |
| Differentiate functions | To find the derivatives of different mathematical functions to analyze their behavior. | To solve the equation, we need to differentiate the functions involved with respect to their variables. |

1. **WORD:**

· **ADJ + sanitize:**

* Properly / adequately / securely / automatically / thoroughly / efficiently / programmatically / rigorously / consistently / effectively

· **sanitize + NOUN:**

* Input / data / environment / output / request / string / file

· **Phrases:**

* Sanitize input / sanitize data / sanitize strings

| **ADJ + sanitize** | **Definition** | **Example** |
| --- | --- | --- |
| Properly sanitize | To ensure that something is cleaned or prepared according to the correct standards or protocols. | Developers must properly sanitize user inputs to prevent security vulnerabilities in web applications. |
| Securely sanitize | To clean or modify data in a way that enhances security and reduces risks. | The application securely sanitizes sensitive information before storing it in the database. |

| **sanitize + NOUN** | **Definition** | **Example** |
| --- | --- | --- |
| Sanitize input | The process of cleaning or validating user input to prevent malicious code execution and ensure data integrity. | It is crucial to sanitize input to mitigate SQL injection attacks in web applications. |
| Sanitize output | The act of ensuring that data sent to the user or another system is clean and free from harmful content. | Before displaying results, the system must sanitize output to avoid exposing sensitive information. |

1. **multiscale: n, countable**

· **ADJ + multiscale:**

* Integrated / adaptive / computational / analysis / modeling / approach / representation / framework / geometric / statistical

· **VERB + multiscale:**

* Use multiscale / develop multiscale / apply multiscale / conduct multiscale

· **Phrases:**

* Multiscale modeling / multiscale analysis / multiscale approach

| **ADJ + multiscale** | **Definition** | **Example** |
| --- | --- | --- |
| Integrated multiscale | Referring to a methodology that combines different scales of analysis or modeling into a cohesive framework. | The integrated multiscale allowed researchers to examine phenomena across various levels of detail. |
| Adaptive multiscale | A technique that adjusts the resolution of analysis based on the specific characteristics of the data being studied. | The adaptive multiscale dynamically changes its parameters based on the features of the input data. |

| **VERB + multiscale** | **Definition** | **Example** |
| --- | --- | --- |
| Use multiscale | To employ methodologies that analyze data or phenomena across different scales. | Scientists aim to use multiscale techniques to improve their understanding of biological systems. |
| Develop multiscale | To create frameworks or models that integrate multiple scales of analysis. | The team worked to develop multiscale strategies for studying urban dynamics and their environmental impacts. |

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