Differential Equations

AP Calculus AB · Vocabulary in context

Word	Example
differential equation /ˌdɪfə'renʃl ɪ'kweɪʒn/	A **differential equation** links a quantity and its rate of change.
derivative /dɪ'rɪvətɪv/	Use the **derivative** to find the curve's slope at this point.
rate of change /reɪt ɒv tʃeɪndʒ/	The **rate of change** is 5 metres per second. 5 metres per second
proportional /prə'pɔ:ʃənl/	The growth rate is **proportional** to the size: double the size, double the rate.
solution /sə'lu:ʃn/	y = Ce^(2x) is a **solution** of dy/dx = 2y. y = Ce^(2x) dy/dx = 2y
verify /'verɪfaɪ/	**Verify** a solution by putting it back into the equation.
family of solutions	The general solution is a **family of solutions**.
arbitrary constant	C is an **arbitrary constant**: it can be any number. C
slope field /sləʊp fi:ld/	A **slope field** shows small line segments with the slope at each point.
solution curve /sə'lu:ʃn kɜ:v/	A **solution curve** follows the slopes in the slope field.
tangent /'tændʒənt/	The **tangent** line touches the curve at one point.
equilibrium solution	An **equilibrium solution** is a constant value where the rate of change is zero.
concave down /kɒn'keɪv daʊn/	The graph is **concave down** when it bends like a hill.

exercises.lol exercises.com.cn

Word	Example
separation of variables /ˌsepəˈreɪʃn ɒv ˈveərɪəblz/	Use **separation of variables**: put all y's on one side and x's on the other. y x
constant of integration /ˈkɒnstənt ɒv ˌɪntɪˈgreɪʃn/	The **constant of integration** c is there because every curve $y = x^2 + c$ has the same gradient 2x. $y = x^2 + c$ 2x c
general solution /ˈdʒenərəl səˈluːʃn/	The **general solution** includes the constant c. c
constant solution	$y = 3$ is a **constant solution**: it never changes. $y = 3$
initial condition /ɪˈnɪʃl kənˈdɪʃn/	The **initial condition** $y(0) = 5$ gives the starting value. $y(0) = 5$
particular solution /pəˈtɪkjʊlə səˈluːʃn/	Use the starting value to find c and get the **particular solution**. c
uniqueness	The **uniqueness** theorem says only one solution passes through the point.
continuity /kɒntɪˈnjuːɪti/	The function needs **continuity** on the interval.
partial derivative	A **partial derivative** changes one variable at a time.
domain restriction /dəˈmeɪn rɪˈstrɪkʃn/	A **domain restriction** removes values that do not work.
exponential growth and decay /ˌekspəˈnenʃl grəʊθ ænd dɪˈkeɪ/	**Exponential growth and decay** follow y = Ce^(kt). y = Ce^(kt)
radioactive decay /ˌreɪdɪəʊˈæktɪv dɪˈkeɪ/	**Radioactive decay** changes one element into another.

exercises.lol exercises.com.cn

Word	Example
Newton's law of cooling	**Newton's law of cooling** says hot objects cool faster at first.
half-life /hɑːf laɪf/	After one **half-life**, half the nuclei have decayed.
linear approximation /ˈlɪnɪə əˌprɒksɪˈmeɪʃn/	A **linear approximation** uses the tangent line to estimate a value.
overestimate /ˌəʊvəˈrestɪmət/	A tangent line on a concave-down curve gives an **overestimate**.

exercises.lol exercises.com.cn