Integration and Accumulation of Change

AP Calculus AB · Vocabulary in context

Word	Example
Differentiation /ˌdɪfəˌrenʃiˈeɪʃn/	**Differentiation** finds the rate of change.
Integration /ˌɪntɪˈgreɪʃn/	**Integration** finds the total change.
rate of change /reɪt ɒv tʃeɪndʒ/	The **rate of change** is 5 metres per second. 5 metres per second
accumulated change /əˈkjuːmjʊleɪtɪd tʃeɪndʒ/	The integral of a rate gives the **accumulated change**.
area /ˈeərɪə/	The integral gives the **area** under the curve.
regions	Split the area into **regions** above and below the axis.
rectangles	The **rectangles** get thinner as we use more of them.
geometry /dʒiˈɒmətri/	Use **geometry** to find the area of simple shapes under a graph.
Units /ˈjuːnɪts/	**Units** of the integral are units of y times units of x. y x
Riemann sum /ˈriːmən sʌm/	A **Riemann sum** adds the areas of thin rectangles under a curve.
subintervals /ˌsʌbɪnˈtɜːvlz/	Split [0, 4] into four **subintervals** of width 1. [0, 4] 1
trapezoid /ˈtræpɪzɔɪd/	Each strip under the curve is a **trapezoid**.
endpoint	Check each **endpoint** separately.
• **midpoint** /ˈmɪdpɔɪnt/	The **midpoint** of (0, 0) and (4, 6) is (2, 3). (0, 0) (4, 6) (2, 3)

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Trapezoidal sum /ˈtræpɪzɔɪdl sʌm/	**Trapezoidal sum** estimates use trapezoids under the curve.
uniform /ˈjuːnɪfɔːm/	A **uniform** partition has equal widths.
nonuniform	A **nonuniform** partition has different widths.
overestimate /ˌəʊvəˈrestɪmət/	A tangent line on a concave-down curve gives an **overestimate**.
underestimate /ˌʌndəˈrestɪmət/	A tangent line on a concave-up curve gives an **underestimate**.
definite integral /ˈdefɪnət ˈɪntɪgrəl/	A **definite integral** has limits and gives a number, such as an area.
limit /ˈlɪmɪt/	The terms of 1, ½, ¼, … get closer and closer to a **limit** of 0. 1, ½, ¼, … 0
upper limit	The **upper limit** is the top number on the integral sign.
accumulation function /əˌkjuːmjʊˈleɪʃn ˈfʌŋkʃn/	An **accumulation function** adds up area from a fixed start to x. x
Fundamental Theorem of Calculus /ˌfʌndəˈmentl ˈθɪərəm ɒv ˈkælkjʊləs/	The **Fundamental Theorem of Calculus** links derivatives and integrals.
continuous /kənˈtɪnjuːəs/	The beta particles have a **continuous** range of energies. β
chain rule /tʃeɪn ruːl/	Use the **chain rule** for a function inside another function.
local extremum	A **local extremum** is a high or low point in its area.

Word	Example
sign change /saɪn tʃeɪndʒ/	A **sign change** in f′ from + to − shows a maximum. f′ + −
concave up /kɒn'keɪv ʌp/	The graph is **concave up** when it bends like a cup.
inflection points	**Inflection points** are where the curve changes its bend.
signed area /saɪnd 'eərɪə/	**Signed area** counts area below the x-axis as negative. x
interior point	An **interior point** lies inside the interval, not at an end.
antiderivative /ˌæntɪdɪ'rɪvətɪv/	Check an **antiderivative** by differentiating it.
net change /net tʃeɪndʒ/	The integral of a rate gives the **net change** in the amount.
indefinite integral /ɪn'defɪnət 'ɪntɪgrəl/	An **indefinite integral** always includes a constant of integration, + c. + c
constant of integration /'kɒnstənt ɒv ˌɪntɪ'greɪʃn/	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
u-substitution /juː ˌsʌbstɪ'tjuːʃn/	Use **u-substitution** to simplify the integral.
derivative /dɪ'rɪvətɪv/	Use the **derivative** to find the curve's slope at this point.
polynomial long division /ˌpɒlɪ'nəʊmɪəl lɒŋ dɪ'vɪʒn/	Use **polynomial long division** before integrating.
degree /dɪ'griː/	A higher **degree** gives a better approximation.

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Word	Example
rational function /'ræʃənl 'fʌŋkʃn/	A **rational function** is one polynomial divided by another.
completing the square /kəm'pliːtɪŋ ðə skweə/	Use **completing the square** to read a quadratic's turning point.
quadratic /kwɒ'drætɪk/	$x^2 + 5x + 6 = 0$ is a **quadratic** equation. $x^2 + 5x + 6 = 0$
denominator /dɪ'nɒmɪneɪtə/	The **denominator** is the bottom of a fraction.
arctangent	The integral of $1/(1 + x^2)$ is **arctangent** of x. $1/(1 + x^2)$ x
logarithm /'lɒgərɪθəm/	Take the **logarithm** of both sides.
integrand	In $\int x^2\,dx$, the **integrand** is x^2. $\int x^2\,dx$ x^2
power rule /'paʊə ruːl/	The **power rule** says the derivative of x^n is nx^{n-1}. x^n nx^{n-1}