

INKMATHS FLASHCARDS

Differentiation standard results

14 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in precise wording, the standard results the formulae booklet does not print, a check-yourself question per topic, and the slips that lose marks. The same cards run on the website with spaced-repetition scheduling, at inkphysics.co.uk/maths/flashcards.

STANDARD RESULT

Power rule:

$$(d)/(dx)(x^n) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Exponential:

$$(d)/(dx)(e^{kx}) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Natural log:

$$(d)/(dx)(\ln x) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Sine (x in radians):

$$(d)/(dx)(\sin x) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Cosine (x in radians):

$$(d)/(dx)(\cos x) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

General exponential:

$$(d)/(dx)(a^{kx}) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Chain rule:

$$y \text{ in terms of } u, u \text{ in terms of } x: (dy)/(dx) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Product rule:

$$y = uv: (dy)/(dx) = ?$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(d)/(dx)(e^{kx}) = ke^{kx}$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(d)/(dx)(x^n) = nx^{n-1}$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(d)/(dx)(\sin x) = \cos x$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(d)/(dx)(\ln x) = (1)/(x)$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(d)/(dx)(a^{kx}) = ka^{kx} \ln a$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(d)/(dx)(\cos x) = -\sin x$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(dy)/(dx) = u(dv)/(dx) + v(du)/(dx)$$

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$(dy)/(dx) = (dy)/(du) \times (du)/(dx)$$

DIFFERENTIATION: STANDARD RESULTS

RECALL

State how to connect two rates of change.

DIFFERENTIATION: STANDARD RESULTS

RECALL

State how to classify a stationary point.

DIFFERENTIATION: STANDARD RESULTS

DEFINITION

Define: Differentiation from first principles.

DIFFERENTIATION: STANDARD RESULTS

CHECK YOURSELF

Differentiate $y = 3 \ln x - \cos 2x$.

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

Implicit and parametric:

$(d)/(dx)(y^2) = ?$, parametric $(dy)/(dx) = ?$

DIFFERENTIATION: STANDARD RESULTS

SPOT THE ERROR

Say what is wrong with this claim:

The derivative of $\cos x$ is $\sin x$.

DIFFERENTIATION: STANDARD RESULTS

RECALL

Solve $f'(x) = 0$, then look at $f''(x)$ there. Negative means a maximum, positive means a minimum. Zero settles nothing, so go back to the sign of $f'(x)$ either side. Markers give no credit for a verdict with no second derivative and no sign table behind it.

DIFFERENTIATION: STANDARD RESULTS

RECALL

String the derivatives together with the chain rule so the middle variable cancels. To get dV/dt from a known dr/dt , write $dV/dt = dV/dr \times dr/dt$. Write the chain you want first and then hunt for the pieces, rather than differentiating everything in sight.

DIFFERENTIATION: STANDARD RESULTS

CHECK YOURSELF

$$dy/dx = 3/x + 2 \sin 2x.$$

The 2 appears from the chain rule on $\cos 2x$, and the sign flips because the derivative of $\cos$ is minus $\sin$.

DIFFERENTIATION: STANDARD RESULTS

DEFINITION

The derivative of $f(x)$ is the limit as h tends to zero of $(f(x+h) - f(x))/h$, provided the limit exists.

DIFFERENTIATION: STANDARD RESULTS

SPOT THE ERROR

It is $-\sin x$. Sine's derivative is $\cos x$ with no sign change; cosine's picks up the minus. Sketch both curves: $\cos x$ is falling just after zero, so its gradient there must be negative.

DIFFERENTIATION: STANDARD RESULTS

STANDARD RESULT

$$2y(dy)/(dx), (dy)/(dt) \div (dx)/(dt)$$

DIFFERENTIATION: STANDARD RESULTS