

Addition

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|---|
| $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ |
| $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ |
| $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$ |

Double Angle

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|---|
| $\sin 2x = 2 \sin x \cos x$ |
| $\cos 2x = \cos^2 x - \sin^2 x$ |
| $\cos 2x = 2 \cos^2 x - 1$ |
| $\cos 2x = 1 - 2 \sin^2 x$ |
| $\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$ |

Standard Functions - Calculus

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|--------------------------|------------------------------|----------------------------------|
| $\sin x$ | $\xrightarrow{\frac{d}{dx}}$ | $\cos x$ |
| $\cos x$ | | $-\sin x$ |
| $\tan x$ | | $\sec^2 x$ |
| $\cot x$ | | $-\operatorname{cosec}^2 x$ |
| $\sec x$ | | $\sec x \tan x$ |
| $\operatorname{cosec} x$ | $\int dx$ | $-\operatorname{cosec} x \cot x$ |
| $\ln x$ | | $\frac{1}{x}$ |
| e^x | | e^x |
| a^x | | $\ln a \cdot a^x$ |

Some hints:

Split the Numerator

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| $\frac{x-1}{x} = \frac{x}{x} - \frac{1}{x}$ <i>etc.</i> |
| $\frac{\sin x - 1}{\cos^2 x} = \frac{\sin x}{\cos^2 x} - \frac{1}{\cos^2 x}$ |

Reverse Chain

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| $\frac{x}{x^2 - 3}$ |
| $\cos x \sin^4 x$ |

Partial Fractions

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| $\frac{2}{(x+3)(x-2)}$ |
| $\frac{1}{x^2 + x}$ |

Alg. Division

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|-------------------|
| $\frac{x+1}{x-1}$ |
| $\frac{x^2}{x+1}$ |

Pythagorean

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| $\sin^2 x + \cos^2 x = 1$ |
| $1 + \tan^2 x = \sec^2 x$ |
| $1 + \cot^2 x = \operatorname{cosec}^2 x$ |

Rearranged Double Angle

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| $\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos 2x$ |
| $\cos^2 x = \frac{1}{2} + \frac{1}{2} \cos 2x$ |

Cofunction

| | |
|-------------------------|-------------------------|
| $\sin x = \cos(90 - x)$ | eg. $\sin 25 = \cos 65$ |
| $\cos x = \sin(90 - x)$ | eg. $\cos 75 = \sin 15$ |

Product

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|------|-------------|
| uv | $uv' + vu'$ |
|------|-------------|

Quotient

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|---------------|-------------------------|
| $\frac{u}{v}$ | $\frac{vu' - uv'}{v^2}$ |
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Parametric Diff.

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| $\frac{dy}{dx} = \frac{dy}{dt} \div \frac{dx}{dt}$ |
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Subst. checklist

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| S – substitute |
| L – change limits |
| D – derivative of u |

Integration by parts

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| $\int uv' \, dx = uv - \int u'v \, dx$ | $\ln x$ takes priority for u |
|--|------------------------------|

Parametric Int.

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| $\int y \frac{dx}{dt} \, dt$ |
|------------------------------|

Differential eqns

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| Separate the variables |
| $y \leftarrow \quad x \rightarrow$ |