Differentiation (Year 13)

Differentiation of some standard functions

1. If $y = x^n$,

   $\frac{dy}{dx} = nx^{n-1}$, where n is a constant.

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2. If $y = e^x$,

   $\frac{dy}{dx} = e^x$

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3. If $y = \ln x$,

   $\frac{dy}{dx} = \frac{1}{x}$

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4. If $y = \sin x$,

   $\frac{dy}{dx} = \cos x$

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5. If $y = \cos x$,

   $\frac{dy}{dx} = -\sin x$

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6. If $y = \tan x$,

   $\frac{dy}{dx} = \sec^2 x$

7. If $y = sec\ x$,

$$\frac{dy}{dx} = secx\ tanx$$

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8. If $y = cosec\ x$,

$$\frac{dy}{dx} = -\ cosecx\ cotx$$

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9. If $y = cot\ x$,

$$\frac{dy}{dx} = -\ cosec^2 x$$

Some other rules of Differentiation

1. If $y = kf(x)$,

$\frac{dy}{dx} = kf'(x)$, where k is a constant.

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2. If $y = k$,

$\frac{dy}{dx} = 0$, where k is a constant.

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3. $y = f(x) + g(x) + h(x) + ...$,

$$\frac{dy}{dx} = f'(x) + g'(x) + h'(x) + \cdots$$

You can differentiate one by one this way, **only if functions are added or subtracted**.

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4. Chain Rule

Refer to class work.

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5. Product Rule

Refer to class work.

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6. Quotient Rule

Refer to class work.
