Exponential Functions

Recall: An exponential function is a function of the form:

$$f\left(x\right)=f\_{o}a^{x}$$

where $f\_{o}=f(0)$

Constant relative change for $∆x=1$

That is, as $x$ increases by 1, $f(x)$ gets $a$ times bigger.

$\frac{d}{dx}\left(f\_{o}a^{x}\right)=$

$$\frac{d}{dx}\left(a^{x}\right)$$

Try: $a=2$

$f\left(x\right)=2^{x}$

|  |  |
| --- | --- |
| $$x$$ | $$f'(x)$$ |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Recall: $f^{'}\left(x\right)= \lim\_{∆x\to 0}\frac{f\left(x+∆x\right)-f\left(x\right)}{∆x}$

|  |  |
| --- | --- |
| $$∆x$$ | Approx of*f ’*(0) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Example: $f\left(x\right)=2^{x}$

Find $f'(0)$

$\frac{f\left(0+∆x\right)-f\left(0\right)}{∆x}$

|  |  |
| --- | --- |
| $$∆x$$ | Approx of*f ’*(2) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Find $f'(2)$

$\frac{f\left(2+∆x\right)-f\left(2\right)}{∆x}$

$f\left(x\right)=2^{x}$

$f^{'}\left(x\right)=$

In general:

$$\frac{d}{dx}\left(a^{x}\right)=$$