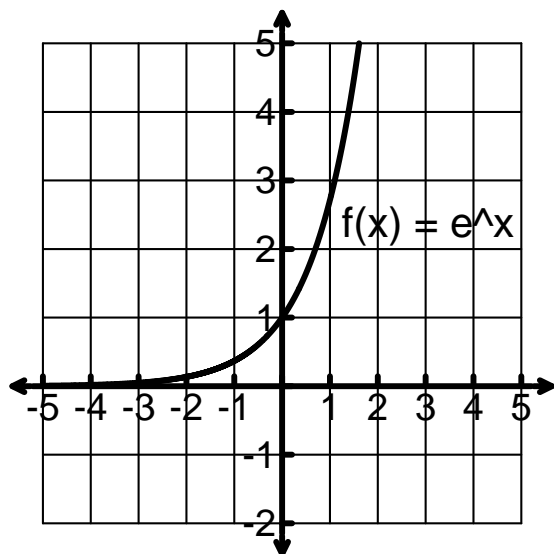


Natural Exponential Function

p. 240 - 245 (3.7)

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1. The inverse of $f(x) = e^x$ is $f^{(-1)}(x) = \ln(x)$.
2. Continuous, increasing everywhere (monotonic), and above the x -axis
3. $\lim_{x \rightarrow -\infty} e^x = 0$ and $\lim_{x \rightarrow \infty} e^x = \infty$
4. Exponential functions grow faster than polynomial or logarithmic functions.

$$\frac{d}{dx}(e^x) = e^x$$

$$\frac{d}{dx} = du(e^u)$$

Find the derivatives:

1. $y = e^{(2x-1)}$

**2. If $f(x) = \frac{e^{2x}}{2x}$, then find $f'(x)$.

**3. If $f(x) = e^x$, which of the following is equal to $f'(e)$?

A. $\lim_{h \rightarrow 0} \frac{e^{(x+h)} - e^e}{h}$ B. $\lim_{h \rightarrow 0} \frac{e^{(e+h)} - e}{h}$ C. $\lim_{h \rightarrow 0} \frac{e^{(e+h)} - e^e}{h}$

** (calc.) 4. Let f be a function given by $f(x) = 3e^{2x}$ and let g be a function given by $g(x) = 6x^3$. At what value(s) of x do the graphs of f and g have parallel tangent lines?

Notes

1. Differentiate $y = e^{-3/x}$

2. Find the instantaneous rate of change for $f(x) = e^x \cos(x)$ at $x = 0$.

3. Differentiate $y = \left(\frac{x^2(e^{3x})}{3} \right)$

4. If $H(x) = e^{2x} \sin(3x)$, find $H'(x)$.

5. Find y' if $y = \frac{\tan(2x)}{e^{3x}}$

6. (calc) At what point on the curve $y = 1 + 2e^x - 3x$ is the tangent line parallel to the line $3x - y = 5$?

7. If $f(x) = e^x g(x)$, where $g(0)=2$ and $g'(0)=5$, find $f'(0)$.