1. If $y = -Ax^{\frac{3}{5}}$. Find $\frac{dy}{dx}$, where $A$ is a constant

2. If $y = \frac{1}{x}$, find $\frac{dy}{dx}$ using first principle.

**Solution:**

Using that derivatives of powers: if $f(x) = x^n$, where $n$ is any real number, then $f'(x) = nx^{n-1}$

So

If $y = -Ax^{\frac{3}{5}}$, and $A$ is a constant

$$y' = \left(-Ax^{\frac{3}{5}}\right)' = -A\left(x^{\frac{3}{5}}\right)' = -A * \frac{3}{5} * x^{\frac{3}{5}-1} = -\frac{3A}{5}x^{-\frac{2}{3}}$$

**Answer 1:** $y' = -\frac{3A}{5}x^{-\frac{2}{3}}$

From the definition of the derivative $\frac{dy}{dx} = \lim_{\Delta x\to 0}\frac{y(x+\Delta x)-y(x)}{\Delta x}$

If y $= \frac{1}{x}$ we have:

$$y'(x) = \lim_{\Delta x\to 0}\frac{y(x+\Delta x)-y(x)}{\Delta x} = \lim_{\Delta x\to 0}\frac{\frac{1}{x+\Delta x}-\frac{1}{x}}{\Delta x} = \lim_{\Delta x\to 0}\frac{\frac{x-x-\Delta x}{(x+\Delta x)*x}}{\Delta x} = \lim_{\Delta x\to 0}\frac{-\Delta x}{\Delta x*(x+\Delta x)*x}$$
$$= \lim_{\Delta x\to 0}\frac{-1}{(x+\Delta x)*x} = -\frac{1}{x^2}$$

**Answer 2:** $y' = -\frac{1}{x^2}$