## Calculus: Multiple Derivatives Game

Cut out all the pieces below, then arrange the tiles in "chains" so that each chain represents a function and three derivatives (four tiles in each chain). You may find that more than one function lead to the same path of derivatives, so be careful!

Then decide, true or false: If $f'(x) = g'(x)$, then $f(x) = g(x)$.

| | | | |
|---|---|---|---|
| $3e^x - 4x$ | $\pi x + 3e^x$ | $\frac{4}{x}$ | $8\sqrt{x}$ |
| $3x^2 + e^x$ | $\frac{4}{\sqrt{x}}$ | $40x^3$ | $3e^x$ |
| $2x^5 + 4x$ | $6x + e^x$ | $3e^x - 4$ | $-\frac{4}{x^2}$ |
| $6 + e^x$ | $2x^5 + 2x^2 + 6x$ | $\frac{-2}{x^{3/2}}$ | $120x^2$ |
| $e^x - 2x + 1$ | $10x^4 + 4$ | $e^x - 2$ | $\frac{8}{x^3}$ |
| $10x^4 + 4x + 6$ | $\frac{3}{x^{5/2}}$ | $e^x$ | $3e^x$ |
| $e^x - x^2 + x - 1$ | $-\frac{24}{x^4}$ | $40x^3 + 4$ | $\pi + 3e^x$ |

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Answers:

$$\boxed{2x^5+4x} \xrightarrow{\frac{d}{dx}} \boxed{10x^4+4} \xrightarrow{\frac{d}{dx}} \boxed{40x^3} \xrightarrow{\frac{d}{dx}} \boxed{120x^2}$$

$$\boxed{2x^5+2x^2+6x} \xrightarrow{\frac{d}{dx}} \boxed{10x^4+4x+6} \xrightarrow{\frac{d}{dx}} \boxed{40x^3+4} \xrightarrow{\frac{d}{dx}} \boxed{120x^2}$$

$$\boxed{8\sqrt{x}} \xrightarrow{\frac{d}{dx}} \boxed{\frac{4}{\sqrt{x}}} \xrightarrow{\frac{d}{dx}} \boxed{\frac{-2}{x^{3/2}}} \xrightarrow{\frac{d}{dx}} \boxed{\frac{3}{x^{5/2}}}$$

$$\boxed{\frac{4}{x}} \xrightarrow{\frac{d}{dx}} \boxed{-\frac{4}{x^2}} \xrightarrow{\frac{d}{dx}} \boxed{\frac{8}{x^3}} \xrightarrow{\frac{d}{dx}} \boxed{-\frac{24}{x^4}}$$

$$\boxed{3x^2+e^x} \xrightarrow{\frac{d}{dx}} \boxed{6x+e^x} \xrightarrow{\frac{d}{dx}} \boxed{6+e^x} \xrightarrow{\frac{d}{dx}} \boxed{e^x}$$

$$\boxed{e^x-x^2+x-1} \xrightarrow{\frac{d}{dx}} \boxed{e^x-2x+1} \xrightarrow{\frac{d}{dx}} \boxed{e^x-2} \xrightarrow{\frac{d}{dx}} \boxed{e^x}$$

$$\boxed{3e^x-4x} \xrightarrow{\frac{d}{dx}} \boxed{3e^x-4} \xrightarrow{\frac{d}{dx}} \boxed{3e^x} \xrightarrow{\frac{d}{dx}} \boxed{3e^x}$$

$$\boxed{\pi x+3e^x} \xrightarrow{\frac{d}{dx}} \boxed{\pi+3e^x} \xrightarrow{\frac{d}{dx}} \boxed{3e^x} \xrightarrow{\frac{d}{dx}} \boxed{3e^x}$$