WHAT DOES FUNCTION f(x)=2x CALL HER MOTHER'S SISTER $F(x)=x^2$?

An equation involving derivatives is referred to as a differential equation.

If $f'(x) = 4x^3$,

a solution to this equation is $f(x) = x^4$ in fact there are an infinite number of solutions.

Any function of the form $f(x) = x^4 + k$, where k is any constant, is a solution.

 \therefore f(x) = x⁴ + k is called the **general solution** to the differential equation $f'(x) = 4x^3$.

If $f'(x) = 4x^3$ and f(2) = 10, then $f(x) = x^4 + k$ $f(2) = 2^4 + k$ 10 = 16 + k, k = -6 $f(x) = x^4 - 6$

 $f(x) = x^4 - 6$ is called a particular solution to the differential equation $f'(x) = 4x^3$ with initial condition f(2) = 10.

Match each derivative f'(x) with a function f(x) below.

1)	f'	(x)	=	2x	_	1
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2)
$$f'(x) = 3x^2 - 1$$

3)
$$f'(x) = 3$$

4)
$$f'(x) = x^2 - x + 1$$

5)
$$f'(x) = 5x^4 - 4x^3$$

6)
$$f'(x) = x^4 - 4x + 5$$

6)
$$f'(x) = x^4 - 4x + 5$$
 7) $f'(x) = 2x^4 - 2x^2$

8)
$$f'(x) = -x^{-2}$$

9)
$$f'(x) = \frac{1}{2}x^{-1/2}$$

10)
$$f'(x) = \frac{1}{3}x^{-2/3}$$

11)
$$f'(x) = \frac{1}{2\sqrt{x}}$$

12)
$$f'(x) = -\frac{1}{x^2}$$

Functions (anti-derivatives)

A.
$$f(x) = 3x + k$$

B.
$$f(x) = x^3 + k$$

D.
$$f(x) = x^2 - x + k$$
 E. $f(x) = \frac{1}{x} + k$

E.
$$f(x) = \frac{1}{x} + k$$

F.
$$f(x) = \frac{1}{2}\sqrt{x} + k$$
 H. $f(x) = \sqrt[3]{x} + k$ I. $f(x) = \sqrt{x} + k$ N. $f(x) = x^3 - x + k$

H.
$$f(x) = \sqrt[3]{x} + k$$

$$I. \quad f(x) = \sqrt{x + k}$$

N.
$$f(X) = X^3 - X + K$$

R.
$$f(x) = x^5 - x^4 + k$$

S.
$$f(x) = \frac{1}{3}x^2 - \frac{1}{2}x + k$$

R.
$$f(x) = x^5 - x^4 + k$$
 S. $f(x) = \frac{1}{3}x^2 - \frac{1}{2}x + k$ **T.** $f(x) = \frac{1}{3}x^3 - \frac{1}{2}x^2 + x + k$

U.
$$f(x) = \frac{1}{5}x^5 - 2x^2 + 5x + k$$
 V. $f(x) = \frac{2}{5}x^5 - \frac{2}{3}x^3 + k$ **W.** $f(x) = \frac{2}{5}x^5 - 2x^3 + k$

V.
$$f(x) = \frac{2}{5}x^5 - \frac{2}{3}x^3 + k$$

W.
$$f(x) = \frac{2}{5}x^5 - 2x^3 + k$$

Match each differential equation that satisfies the given initial condition with a function below.

13)
$$f'(x) = 2x + 2$$
, $f(0) = 7$

14)
$$f'(x) = 2x + 2$$
, $f(1) = 7$

15)
$$f'(x) = 3x^2 - 3$$
, $f(0) = -1$

16)
$$f'(x) = x^4 - x^2$$
, $f(1) = 0$

17)
$$f'(x) = x^{-3} - \frac{1}{8}$$
, $f(2) = -1$ | 18) $f'(x) = \frac{3}{2}\sqrt{x}$, $f(4) = 4$

18)
$$f'(x) = \frac{3}{2}\sqrt{x}$$
, $f(4) = 4$

Particular solution to differential equations

A.
$$f(x) = x^3 - 3x - 1$$

E.
$$f(x) = x^2 + 2x + 4$$

G.
$$f(x) = x^2 + 2x$$

H.
$$f(x) = x^3 - 3x$$

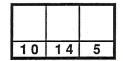
I.
$$f(x) = x^2 + 2x + 7$$

R.
$$f(x) = x\sqrt{x} - 4$$

T.
$$f(x) = -\frac{1}{2x^2} - \frac{x}{8} - \frac{5}{8}$$

V.
$$f(x) = \frac{1}{5}x^5 - \frac{1}{3}x^3 + \frac{2}{15}$$
 Z. $f(x) = \frac{1}{5}x^5 - \frac{1}{3}x^3$

Z.
$$f(x) = \frac{1}{5}x^5 - \frac{1}{3}x^3$$



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3	6	2	4	11	14