Topic: Dividing polynomials

Question: Simplify the expression.

$$(x^2 + x + 8) \div (x - 1)$$

Answer choices:

A $x + 1$

B $x^2 + x + 4$

C x^2

D $x + 2 + \frac{10}{x - 1}$

Solution: D

We'll use polynomial long division.

$$
\begin{array}{r}
x+2+\dfrac{10}{x-1} \\
\hline
x-1 \;\big|\; x^2+x+8 \\
-(x^2-x) \\
\hline
2x+8 \\
-(2x-2) \\
\hline
10
\end{array}
$$

Topic: Dividing polynomials

Question: Simplify the expression.

$$(x^3 + 2x^2 + 12) \div (x - 1)$$

Answer choices:

A $2x^2 + 4x + 4$

B $x^2 + 3x + 3 + \dfrac{15}{x - 1}$

C $x^2 - 3x - 3 + \dfrac{15}{x - 1}$

D $x^2 + 3x - 3 + \dfrac{14}{x - 1}$

Solution: B

We'll use polynomial long division, making sure that we put in a placeholder of $0x$ for the missing term.

$$
\begin{array}{r}
x^2+3x+3+\dfrac{15}{x-1} \\
\hline
x-1 \;\big|\; x^3+2x^2+0x+12 \\
-(x^3-x^2) \\
\hline
3x^2+0x \\
-(3x^2-3x) \\
\hline
3x+12 \\
-(3x-3) \\
\hline
15
\end{array}
$$

Topic: Dividing polynomials

Question: Find the quotient.

$$\frac{6x^4 - 17x^3 + 13x^2 - 24x + 10}{2x - 5}$$

Answer choices:

A $3x^3 - x^2 + 4x - 2$

B $3x^3 - 2x^2 + 4x - 10$

C $3x^3 - x^2 + 9x - 1$

D $3x^3 - x^2 + 4x - 5$

Solution: A

If we use long division to find the quotient, we find the result this way:

$$
\begin{array}{r}
3x^3 - x^2 + 4x - 2 \\
2x-5 \;\overline{)\; 6x^4 - 17x^3 + 13x^2 - 24x + 10} \\
-(6x^4 - 15x^3) \\
\hline
-2x^3 + 13x^2 \\
-(-2x^3 + 5x^2) \\
\hline
8x^2 - 24x \\
-(8x^2 - 20x) \\
\hline
-4x + 10 \\
-(-4x + 10) \\
\hline
0
\end{array}
$$