Divide f(x) by d(x) and write a summary statement in polynomial form and fraction form.

1) $f(x) = 2x^3 - 3x^2 - 5x - 12$ $\quad d(x) = x - 3$

$x - 3 = 0$

$x = 3$

$$\begin{array}{r|rrrr} 3 & 2 & -3 & -5 & -12 \\ & & +6 & +9 & 12 \\ \hline & 2 & 3 & 4 & \boxed{0} \end{array}$$

Fraction $\boxed{\dfrac{f(x)}{d(x)} = 2x^2 + 3x + 4}$

Polynomial Form $\cancel{(x-3)}\dfrac{f(x)}{\cancel{(x-3)}} = (2x^2 + 3x + 4)(x-3) \rightarrow \boxed{f(x) = (2x^2+3x+4)(x-3)}$

Divide f(x) by d(x) and write a summary statement in polynomial form and fraction form.

1) $f(x) = 2x^4 - x^3 - 2$ $\quad d(x) = 2x^2 + x + 1$

$$\begin{array}{r|l} & x^2 - x \\ 2x^2 + x + 1 & 2x^4 - x^3 + 0x^2 + 0x - 2 \\ x^2(2x^2+x+1) & -2x^4 + -x^3 + -x^2 \\ \hline & -2x^3 - x^2 + 0x - 2 \\ -x(2x^2+x+1) & +2x^3 + x^2 + 1x \\ \hline & x - 2 \end{array}$$

$$\frac{f(x)}{dx} = \left(x^2 - x + \frac{x-2}{2x^2+x+1}\right)$$

$$(2x^2+x+1)\frac{f(x)}{2x^2+x+1} = \left(x^2 - x + \frac{x-2}{2x^2+x+1}\right)(2x^2+x+1)$$

$$\boxed{f(x) = (2x^2+x+1)(x^2-x) + x - 2}$$

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Linear

Use the Remainder Theorem to find the remainder when f(x) is divided by (x – k)

a) $f(x) = 3x^2 + 7x - 20$ $k = 2$

$d(x) = x - 2$

$$\begin{array}{r|rrr} 2 & 3 & 7 & -20 \\ & & +6 & 26 \\ \hline & 3 & 13 & \boxed{6} \end{array}$$

→ Remainder
← y-value at x = 6

b) $f(x) = 3x^2 + 7x - 20$ $k = -1$

x = -1 and x = -2 are not x-int

$$\begin{array}{r|rrr} -1 & 3 & 7 & -20 \\ & & -3 & -4 \\ \hline & 3 & 4 & \boxed{-24} \end{array}$$

→ Remainder
← y value at x = -1

c) $f(x) = 3x^2 + 7x - 20$ $k = -4$

x = -4 is a x-intercept of the graph of f(x

$$\begin{array}{r|rrr} -4 & 3 & 7 & -20 \\ & & -12 & 20 \\ \hline & 3 & -5 & \boxed{0} \end{array}$$

→ Remainder
← y-value (-4, 0)

d) $f(x) = x^4 - 1$ $k = 1$

$$\begin{array}{r|rrrrr} & x^4 & x^3 & x^2 & x & \\ 1 & 1 & 0 & 0 & 0 & -1 \\ & & 1 & 1 & 1 & 1 \\ \hline & 1 & 1 & 1 & 1 & \boxed{0} \end{array}$$

x = 1 is a x-int
Factor (x-1)

Use the Factor Theorem to determine whether the first polynomial is a factor of the second polynomial.

$x-2=0$
$x=2$

Possible x-intercept

A) $x-2;\ x^3-4x^2+8x-8$

$x-2$ is a factor of x^3-4x^2+8x-8 if the remainder is 0.

2	1	-4	8	-8
		2	-4	8
	1	-2	4	$\boxed{0}$

$x-2$ is a factor

B) $x+3;\ x^3+2x^2-4x-2$

-3	1	2	-4	-2
		-3	3	3
	1	-1	-1	$\boxed{1}$

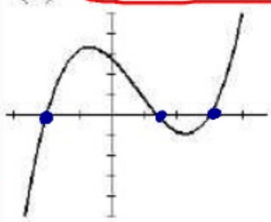
$x+3$ is not a factor

zeros: $x=-2$, $x=3$, $x=7/5$

$f(x)=(x+2)(x-3)(5x-7)$

Use the graph in number 26 to guess possible linear factors of f(x). Then completely factor f(x) with the aid of synthetic division.

$f(x)=5x^3-12x^2-23x+42$



$\boxed{x=3}$

3	5	-12	-23	42
		15	9	-42
-2	5	+3	-14	$\boxed{0}$
		-10	14	
	5	-7	$\boxed{0}$	

$5x^2+3x-14$

$\boxed{x=-2}$?

-2	5	-12	-23	42
		-10	44	-42
3	5	-22	21	$\boxed{0}$
		15	-21	
	5	-7	$\boxed{0}$	

$5x^2-22x+21=0$

$(5x-7)(x-3)=0$

$5x-7=0$

$x=7/5$