Review 2.4-2.5

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

$f(x) = x^4 - 3x^3 + 6x^2 - 3x + 5 \quad d(x) = x^2 + 1$

$$\boxed{(x^2+1)(x^2-3x+5)}$$

$$
\begin{array}{lr}
 & x^2 - 3x + 5 \\
x^2+1 & \overline{)\,x^4 - 3x^3 + 6x^2 - 3x + 5} \\
x^2(x^2+1) & -x^4 \quad + -x^2 \qquad\qquad \\
\hline
 & -3x^3 + 5x^2 - 3x + 5 \\
-3x(x^2+1) & +3x^3 \qquad +3x \quad \\
\hline
 & 5x^2 + 5 \\
5(x^2+1) & -5x^2 + -5 \\
\hline
 & 0
\end{array}
$$

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

yes

x - 3 and $x^3 - x^2 - x - 15$

$$\begin{array}{r|rrrr} 3 & 1 & -1 & -1 & -15 \\ & & 3 & 6 & 15 \\ \hline & 1 & 2 & 5 & \boxed{0} \end{array}$$

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

not a factor

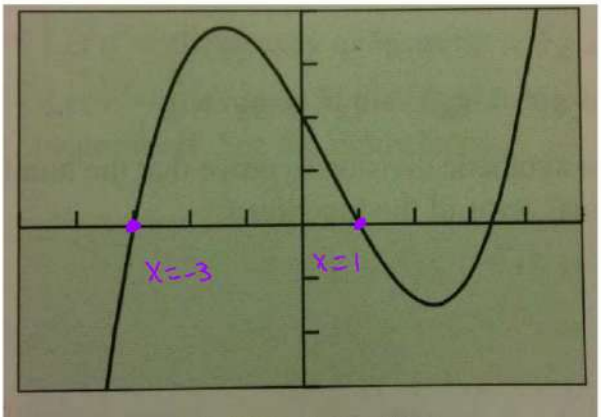
x - 2 and $x^3 + 3x - 4$

$$
\begin{array}{r|rrrr}
2 & 1 & 0 & 3 & -4 \\
  &   & 2 & 4 & 14 \\
\hline
  & 1 & 2 & 7 & \boxed{10}
\end{array}
$$

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

$\boxed{(x+3)(x-1)(5x-17)}$

$5x^3 - 7x^2 - 49x + 51$



[–5, 5] by [–75, 100]

1	5	-7	-49	51
		5	-2	-51
-3	5	-2	-51	$\boxed{0}$
		-15	51	
	5	-17	$\boxed{0}$	

Using only algebraic methods, find the cubic function with the given table of values

x	-4	0	3	5
y	0	180	0	0

$y = a(x+4)(x-3)(x-5)$

$180 = a(0+4)(0-3)(0-5)$

$180 = a(4)(-3)(-5)$

$180 = 60a$

$3 = a$

$y = 3[(x^2 + 1x - 12)(x-5)]$

$y = 3[x^3 + x^2 - 12x - 5x^2 - 5x + 60]$

$y = 3[x^3 - 4x^2 - 17x + 60]$

$\boxed{y = 3x^3 - 12x^2 - 51x + 180}$

Find all of the real zeros of the function given that x = 4 is a zero.
Identify each zero as rational or irrational.

$f(x) = x^3 - 6x^2 + 7x + 4$

4	1	-6	7	4
		4	-8	-4
	1	-2	-1	$\boxed{}$

$x^2 - 2x - 1$

rational

$(x-4)(x^2-2x-1)$

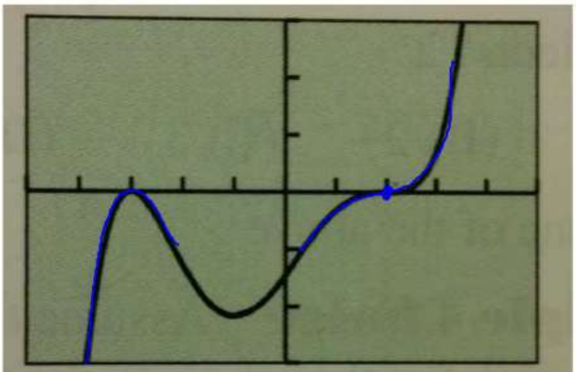
$a=1 \quad b=-2 \quad c=-1$

$$x = \frac{2}{2} \pm \frac{\sqrt{4+4}}{2}$$

$$\boxed{x = 1 \pm \frac{\sqrt{8}}{2}}$$

irrational

Determine the zeros and multiplicity from the graph below



[–5, 5] by [–150, 150]

$x = -3$ (mult = 2)

$x = 2$ (mult = 3)

$$\boxed{f(x) = (x+3)^2 (x-2)^3}$$

Given the zeros and multiplicity ~~from~~ write the equation of the function in factored form. Then sketch a graph of the function.

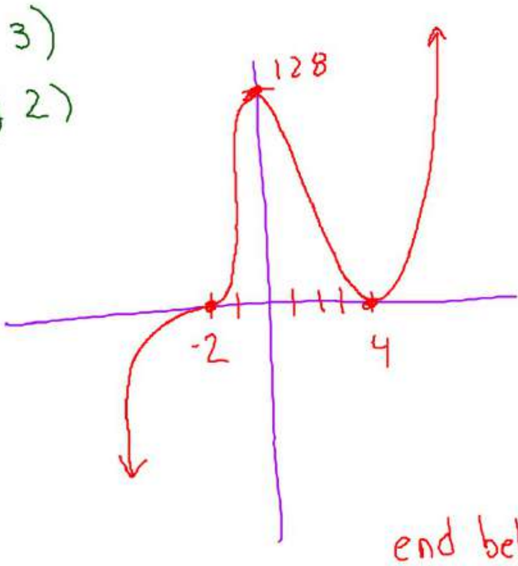
$x = -2$ (multiplicity of 3)

$x = 4$ (multiplicity of 2)

$y = (x+2)^3 (x-4)^2$

y-int $\rightarrow y = (2)^3(-4)^2$
$(x=0)$
$= 8(16)$

$$\begin{array}{r} 16 \\ \underline{8} \\ 128 \end{array}$$



end behavior $y = x^5$

Find the polynomial function with leading coefficient 2 that has the given degree and zeros

Degree: 3, with 2, 1/2, and 3/2 as zeros

$y = (x-2)(2x-1)(2x-3)$

$y = (2x^2-5x+2)(2x-3)$

$y = 4x^3-10x^2+4x-6x^2+15x-6$

$y = 4x^3-16x^2+19x-6$ Leading coefficient of 4

$\boxed{p(x) = 2x^3-8x^2+\frac{19}{2}x-3}$