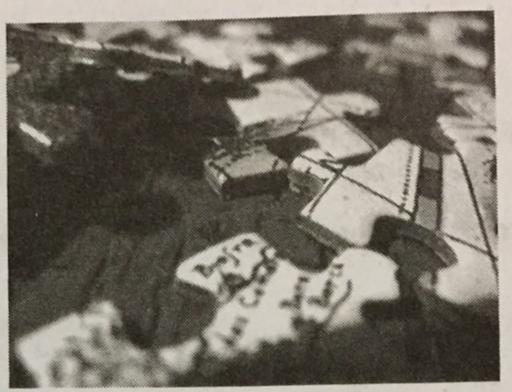
see together
roots
end beh

Lesson 7: Puzzling Over Polynomials

A Practice Understanding Task



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For each of the polynomial puzzles below, a few pieces of information have been given. Your job is to use those pieces of information to complete the puzzle. Occasionally, you may find a missing piece that you can fill in yourself. For instance, although some of the roots are given, you may decide that there are others that you can fill in.

get a better graph

1.

Function (in factored form)

$f(x) = -2(x+2)(x-1)(x-1)$

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

Function (in standard form)

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

End behavior:

as $x \to -\infty$, $f(x) \to \infty$.

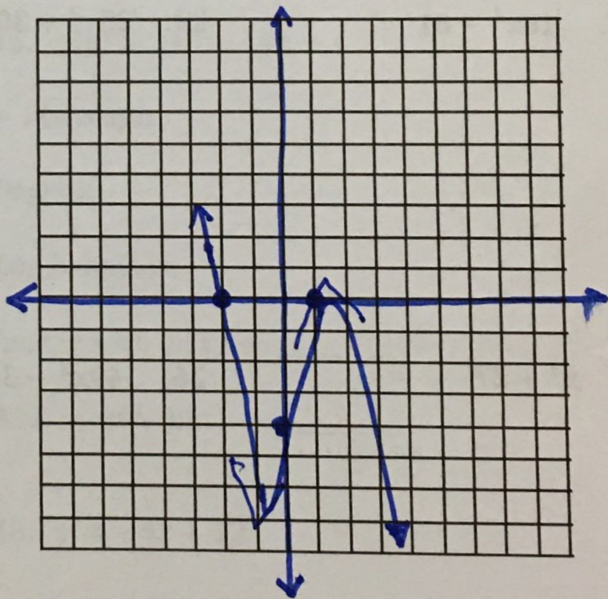
as $x \to \infty$, $f(x) \to -\infty$.

Roots (with multiplicity):
-2, 1, and 1

Value of leading co-efficient:
-2

Degree: 3

Graph:



y-intercept
set $x = 0$
$= -2(2)(-1)(-1)$

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2.

Function (in factored form)

$y = x(x-4)(x-2+i)(x-2-i)$

Function (in standard form)

$y = x^4 - 8x^3 + 21x^2 - 20x$

End behavior:

as $x \to -\infty$, $f(x) \to \underline{\infty}$

as $x \to \infty$, $f(x) \to \underline{\infty}$

Roots (with multiplicity):

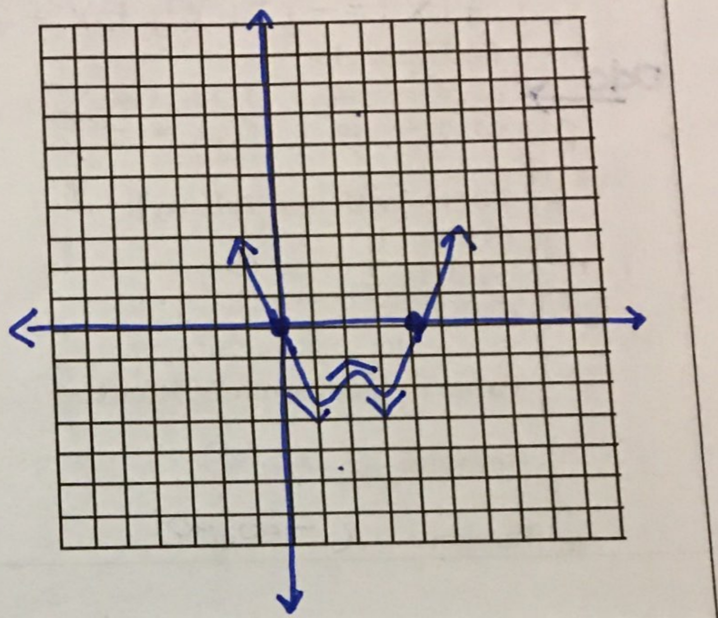
$2+i, 4, 0$

Value of leading co-efficient:

1

Degree: 4

Graph:



$x = 2+i$
$x = 2-i$
$x = 4$
$x = 0$

y-int set $x = 0$

$y = 0\cancel{(0-4)}(0) = 0$

3.

Function:

$f(x) = 2(x-1)(x+3)^2$ 3rd

End behavior:

as $x \to -\infty$, $f(x) \to \underline{-\infty}$

as $x \to \infty$, $f(x) \to \underline{\infty}$

Roots (with multiplicity):

$x = 1$ $x = -3$ M2

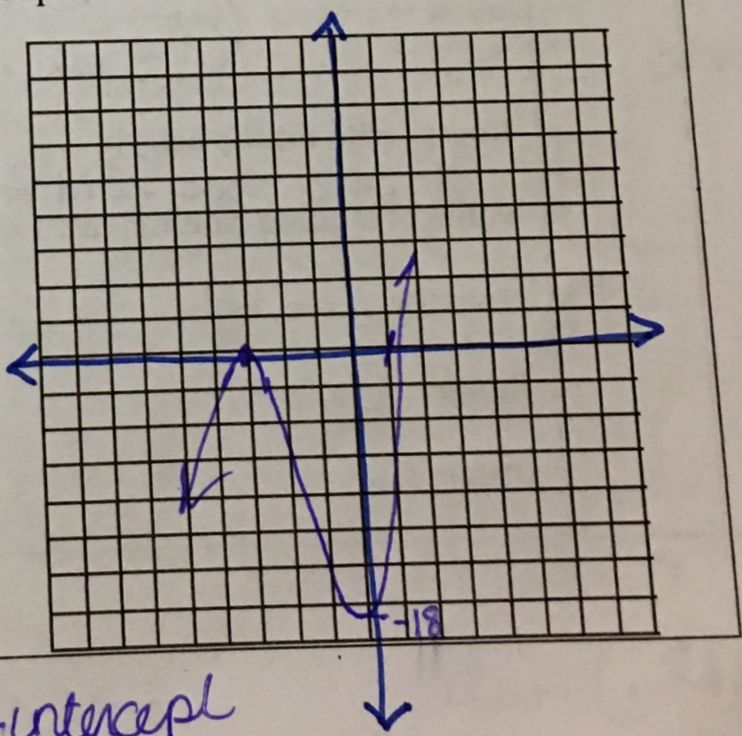
Value of leading co-efficient:

2

Domain: $(-\infty\ \infty)$

Range: All Real numbers

Graph:



Standard Form:

y-intercept

$2(-1)(3)^2$

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$f(x)=(x-3)(x+1)^2(x)^2(-1)$

4.

Function:

$f(x)=-x^5+x^4+5x^3+3x^2$

End behavior:

odd

as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to -\infty$

Roots (with multiplicity):

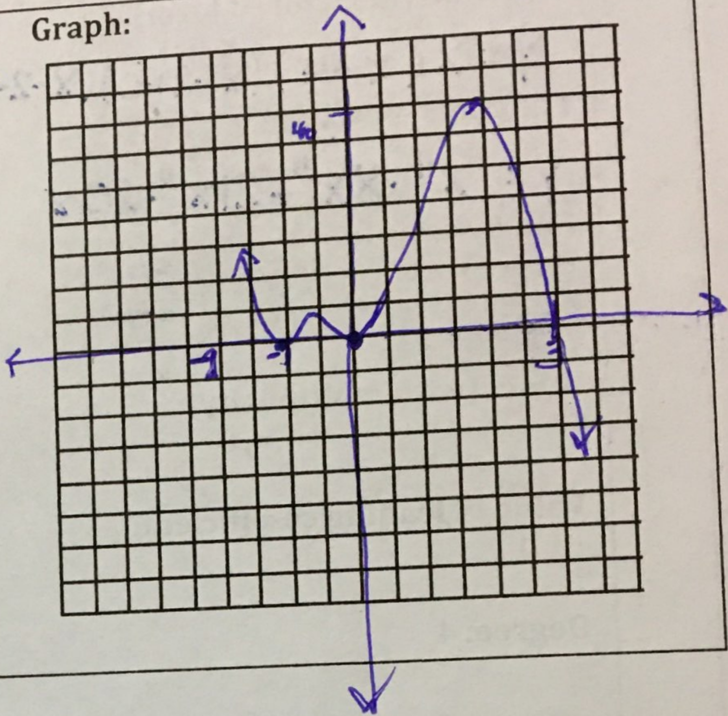
(3,0) m: 1;
(-1,0) m: 2
(0,0) m: 2

Value of leading co-efficient: -1

Domain: $(-\infty,\infty)$

Range: $(-\infty,\infty)$

Graph:



5.

Function: $f(x)=(x+2)^2(x-2)^2$

End behavior:

as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to \infty$

Roots (with multiplicity):

X=2 M2 X=-2 M 2

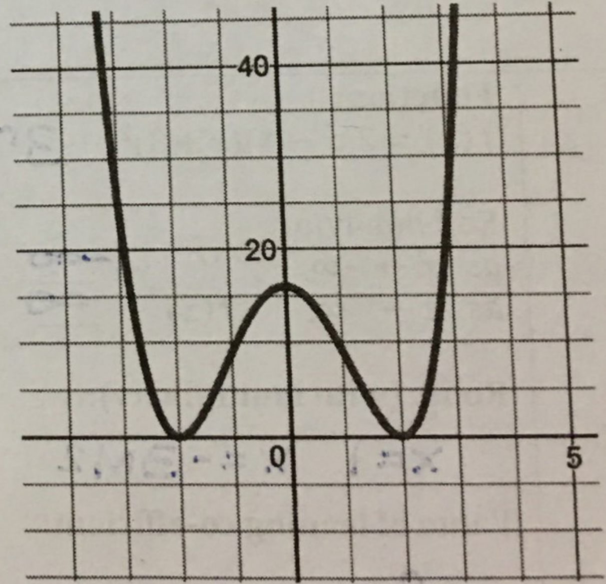
Value of leading co-efficient: 1

Domain: $(-\infty,\infty)$

Range: $[0,\infty)$

Other: $f(0) = 16$

Graph:



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6.

Function (in standard form):
$f(x) = x^3 - 2x^2 - 7x + 2$

Function (in factored form):
$f(x) = (x+2)(x-2+\sqrt{3})(x-2-\sqrt{3})$

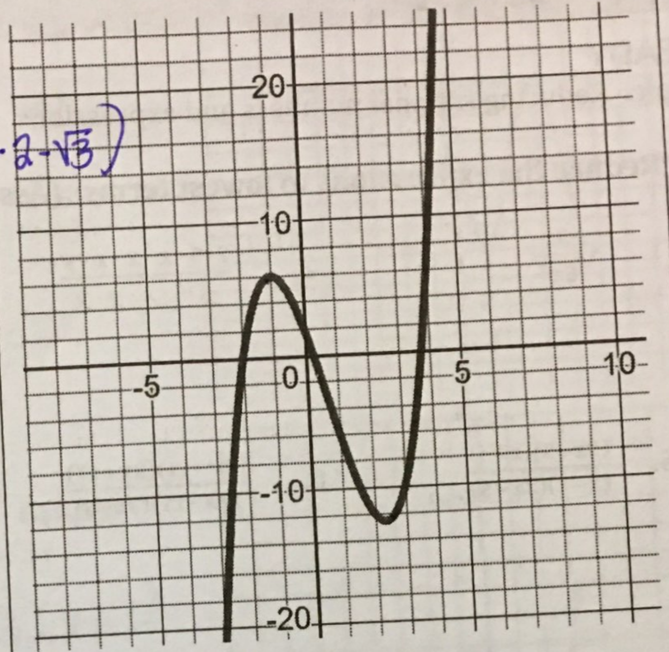
End behavior:
as $x \to -\infty$, $f(x) \to -\infty$
as $x \to \infty$, $f(x) \to \infty$

Roots (with multiplicity):
-2 $\quad 2 \pm \sqrt{3}$

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Graph:



7.

Function (in standard form):
$f(x) = x^3 - 2x$
$x(x^2-2)$

Function (in factored form):
$f(x) = x(x-\sqrt{2})(x+\sqrt{2})$

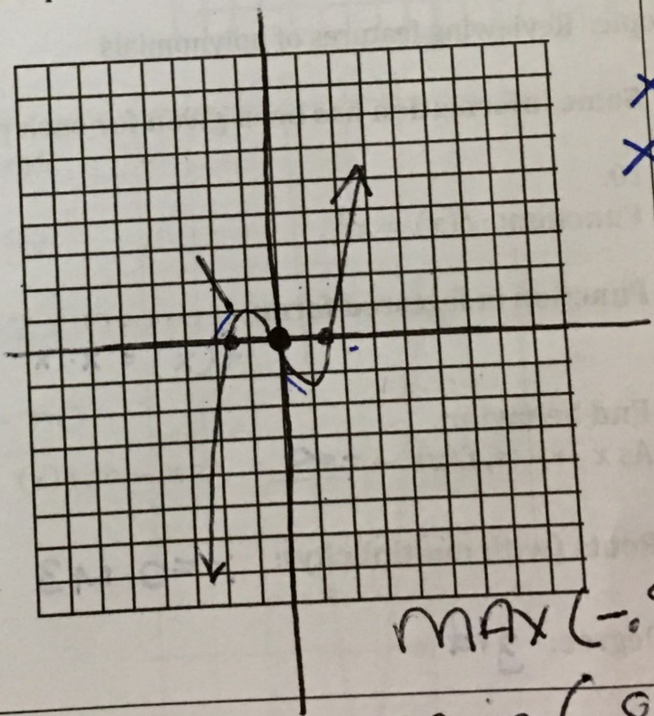
End behavior:
as $x \to -\infty$, $f(x) \to -\infty$
as $x \to \infty$, $f(x) \to \infty$

Roots (with multiplicity):
$0, \pm\sqrt{2}$

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty$

Graph:



$x^2 - 2 = 0$
$x^2 = 2$
$x = \pm\sqrt{2}$

MAX $(-.816, 1.08$
min $(.816, -1.0$

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READY, SET, GO!	Name	Period	Date

READY

Topic: Reducing rational numbers and expressions

Reduce the expressions to lowest terms. (Assume no denominator equals 0.)

1. $\frac{3x}{6x^2}$
2. $\frac{2\cdot5\cdot x\cdot x\cdot x\cdot y}{3\cdot5\cdot x\cdot y\cdot y}$
3. $\frac{7ab^2}{7ab^2}$
4. $\frac{(x+2)(x-9)}{(x+2)(x-9)}$
5. $\frac{(3x-5)(x+4)}{(x-1)(3x-5)}$
6. $\frac{(2x-11)(3x+17)}{(2x-11)(3x-5)}$
7. $\frac{(8x-7)(x+3)}{8x(x+3)(2x-3)}$
8. $\frac{3x(2x+7)(x-1)(6x-5)}{x(2x+7)(x-1)(6x-5)}$
9. Why is it important that the instructions say to assume that no denominator equals 0?

SET

Topic: Reviewing features of polynomials

Some information has been given for each polynomial. Fill in the missing information.

10.

Function: $f(x) = x^3$

Function in factored form: f(x) = x · x · x

End behavior:

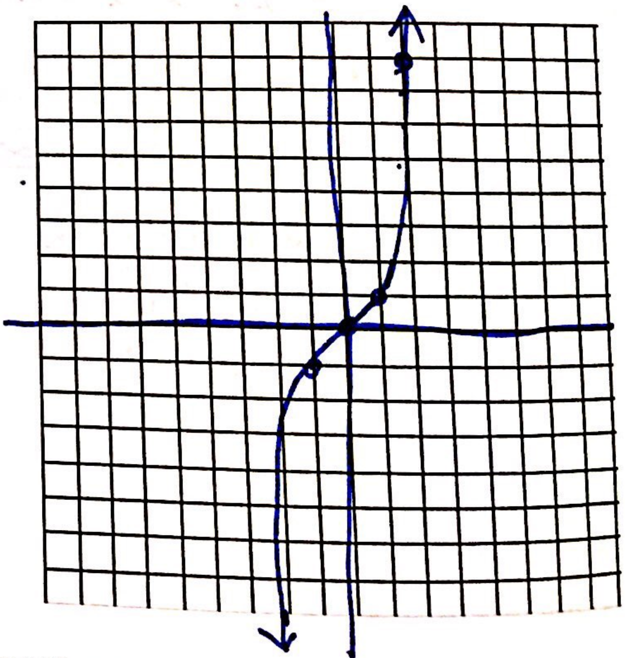
As $x \to -\infty, f(x) \to$ $-\infty$ As $x \to \infty, f(x) \to$ $+\infty$

Roots (with multiplicity): x = 0 M3

Degree: 3rd

Value of leading co-efficient: 1

Graph:



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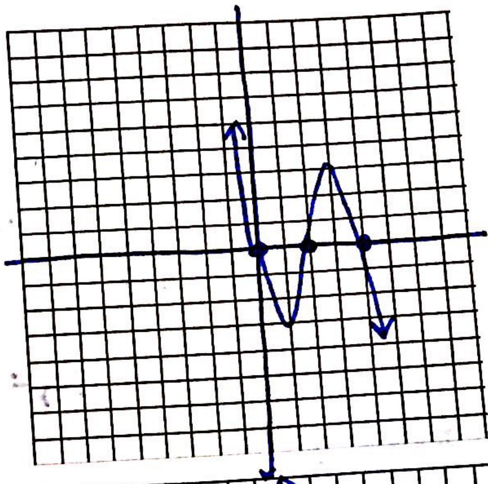
11.

Function in standard form: $g(x) = -x^3 + 6x^2 - 8x$

Graph:



Function in factored form: $g(x) = -x(x-2)(x-4)$

End behavior:
As $x \to -\infty, g(x) \to$ $+\infty$ As $x \to \infty, g(x) \to$ $-\infty$

Roots (with multiplicity): 0, 2, 4

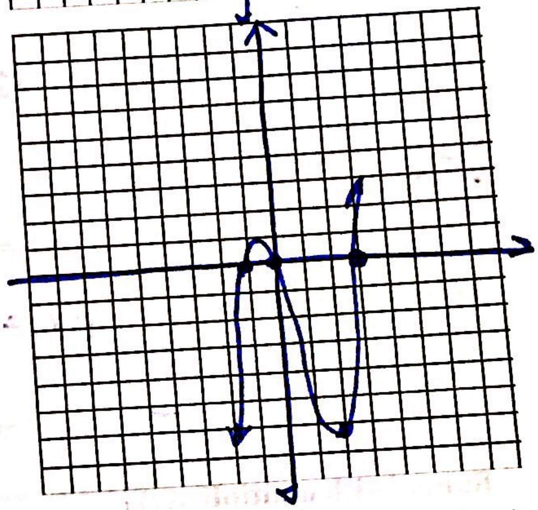
Degree: 3

Value of leading co-efficient: -1

12.

Function in standard form: $h(x) = x^3 - 2x^2 - 3x$

Graph:



Function in factored form: $h(x) = x(x-3)(x+1)$

End behavior:
As $x \to -\infty, h(x) \to$ $-\infty$ As $x \to \infty, h(x) \to$ $+\infty$

Roots (with multiplicity): $-1, 0, 3$

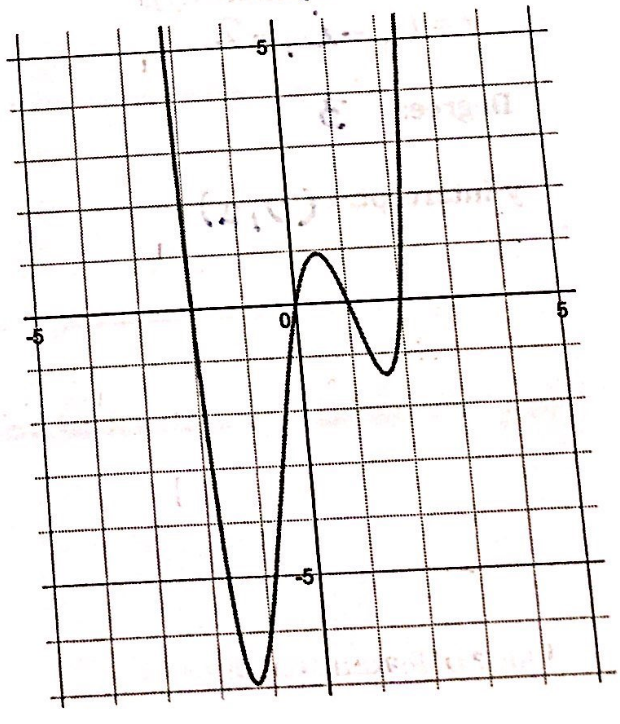
Degree: 3

Value of $h(2)$: $= -6$

13.

Function in standard form: $f(x) = x^4 - x^3 - 4x^2 + 4x$

Graph:



Function in factored form:
$f(x) = x(x-1)(x-2)(x+2)$

End behavior:
As $x \to -\infty, f(x) \to$ $+\infty$ As $x \to \infty, f(x) \to$ $+\infty$

Roots (with multiplicity): $x = -2, 0, 1, 2$

Degree: 4

y-intercept: $(0,0)$

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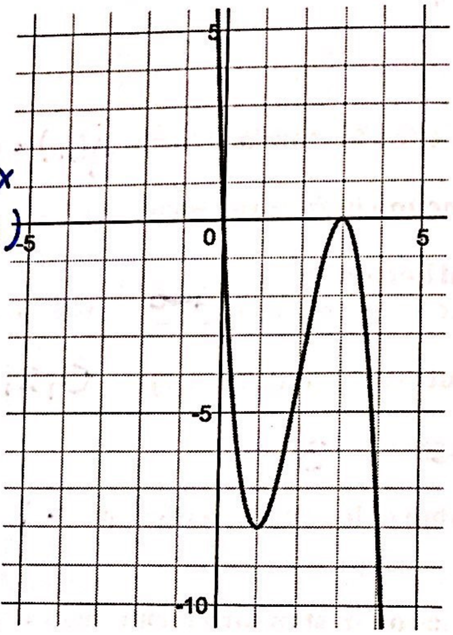
14.

Graph:



Function in standard form: $f(x) = -2x^3 + 12x^2 - 18x$

Function in factored form: $f(x) = -2x(x-3)(x-3)$

End behavior:
As $x \to -\infty, p(x) \to$ $+\infty$ As $x \to \infty, p(x) \to$ $-\infty$

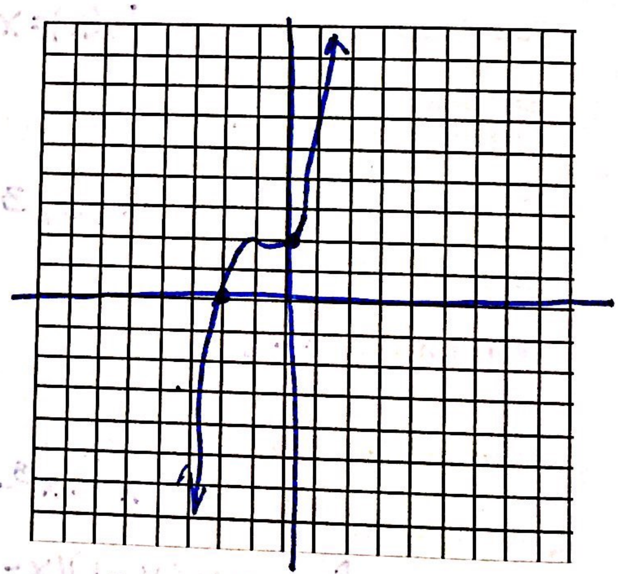
Roots (with multiplicity): $x = 0,\ 3$ M2

Degree: 3

Value of leading coefficient: -2

~~15.~~

Graph:



Function in standard form: $q(x) = x^3 + 2x^2 + x + 2$

Function in factored form: $q(x) = (x+2)(x^2+1)$

End behavior:
As $x \to -\infty, q(x) \to$ $-\infty$ As $x \to \infty, q(x) \to$ ∞

Roots (with multiplicity):
$x = i, -i, -2$

Degree: 3

y-intercept: $(0,2)$

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