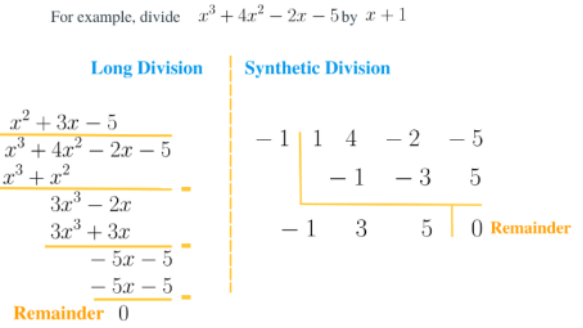
Tuesday, Feb. 6th

Plan For Today:

1. Questions from Chapter 1 or 2?
   - ✵ Do Unit 1 Test
     - 12 Multiple Choice & 20 marks on the Written
     - ~1.5 hour
     - Closed-book - no notes
     - I will go over this marked exam on Thursday
     - Rewrite is next Tuesday after class at 12:30pm
2. Any questions from 3.1-3.2?
3. Start Chapter 3: Polynomial Functions
   - ✓ 3.1: Characteristics of Polynomial Functions
   - ✓ 3.2: Equations & Graphs of Polynomials Functions
   - ✸ **3.3: The Remainder Theorem**
   - ✸ **3.4: Factoring Review & The Factor Theorem**
   - ✸ 3.5: Applications & Word Problems
4. Work on practice questions from Workbook



Plan Going Forward:

1. I will go over the Unit 1 marked test at the start of next class.
   - ✸ Rewrite is next Tuesday after class at 12:30pm
2. Work on 3.3-3.4 questions in the workbook.

   - ✸ 3.1-3.4 CHECK-IN QUIZ ON THURSDAY, FEB. 8TH

3. We will finish chapter 3 on Thursday.

   - ✸ CHAPTER 3 PROJECT DUE TUESDAY, FEB. 13TH
   - ✸ CHAPTER 3 TEST ON TUESDAY, FEB. 13TH

4. We will start Chapter 4 next Tuesday after the Ch3 Test.

Please let me know if you have any questions or concerns about your progress in this course. The notes from today will be posted at anurita.weebly.com after class. Anurita Dhiman = adhiman@sd35.bc.ca

Determine the characteristics of the following polynomial functions.

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

1. Degree = 3 ODD	
2. Leading Coefficient = 1	
3. Positive/Negative = +	
4. Behaviour = down into Q III + up into QI	
5. # of turning points = 0, 2	
6. # of x-intercepts = 1 to 3 (1, -3)	
7. y-intercept = (0, -2)	

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

1. Degree = 4 EVEN
2. Leading Coefficient = 1
3. Positive/Negative = +
4. Behaviour = up into QII + QI
5. # of turning points = 1, 3
6. # of x-intercepts = 0 to 4
7. y-intercept = (0, 4) don't write y = 4

3. $f(x) = x^5 - 4x^3 + 4x - 1$

1. Degree =
2. Leading Coefficient =
3. Positive/Negative =
4. Behaviour =
5. # of turning points =
6. # of x-intercepts =
7. y-intercept =

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

1. Degree =
2. Leading Coefficient =
3. Positive/Negative = −
4. Behaviour =
5. # of turning points =
6. # of x-intercepts =
7. y-intercept =

3.3 Dividing Polynomials.

- Synthetic Division (uses coefficients to determine quotient)

p. 132. → Step. 6

p. 133 → Ex1 GOOD.

p. 134 Ex2.

$P(x) = 4x^5 - 30x^3 - 50x + 2 \div (x+3) \rightarrow x = -3$

quotient
divisor) dividend
Remainder

① x value | coefficients from polynomial
+
×

* missing degrees require zero

② $x+3$ | x^5 $0x^4$ $-30x^3$ $0x^2$ $-50x$ 2

-3 | 4 0 -30 0 -50 2

$+$ | -12 36 -18 54 -12

$\times$ | 4 -12 6 -18 4 -10

ADD

$4x^4 - 12x^3 + 6x^2 - 18x + 4$ quotient

$R = -10$ remainder

Division Statement

question $\frac{P(x)}{x-a}$ = quotient + $\frac{R}{\text{binomial } (x-a)}$

$$\frac{4x^5 - 30x^3 - 50x + 2}{x+3} = 4x^4 - 12x^3 + 6x^2 - 18x + 4 - \frac{10}{x+3}$$

TRY p. 136 #2

KEY Characteristics Practice

Determine the characteristics of the following polynomial functions.

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

1. Degree = 3	
2. Leading Coefficient = 1	
3. Positive/Negative = +	
4. Behaviour = down into QIII & up into QI 	
5. # of turning points = 0, 2	
6. # of x-intercepts = 1 −3	
7. y-intercept = (0, −2)	

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

1. Degree = 4
2. Leading Coefficient = 1
3. Positive/Negative = +
4. Behaviour = up into QII & up into QI
5. # of turning points = 1, 3
6. # of x-intercepts = 0 −4
7. y-intercept = (0, 4)

3. $f(x) = x^5 - 4x^3 + 4x - 1$

1. Degree = 5	
2. Leading Coefficient = 1	
3. Positive/Negative = +	
4. Behaviour = down into QIII & up into QI	
5. # of turning points = 0, 2, 4	
6. # of x-intercepts = 1 −5	
7. y-intercept = (0, −1)	

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

1. Degree = 2
2. Leading Coefficient = −1
3. Positive/Negative = −
4. Behaviour = down into QIII & down into QII
5. # of turning points = 1
6. # of x-intercepts = 0 −2
7. y-intercept = (0, −7)

5. $f(x) = -x^3 + 10x^2 - 33x + 32$

1. Degree = 3	
2. Leading Coefficient = -1	
3. Positive/Negative = $-$	
4. Behaviour = up into QII & down into QIV	
5. # of turning points = 0, 2	
6. # of x-intercepts = 1–3	
7. y-intercept = (0, 32)	

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

1. Degree = 4
2. Leading Coefficient = -1
3. Positive/Negative = $-$
4. Behaviour = down into QIII & down into QIV
5. # of turning points = 1, 3
6. # of x-intercepts = 0–4
7. y-intercept = (0, −2)

Dividing Polynomials

Dividing Polynomials

Long Division

$$x-3 \;\overline{)\; 2x^3-5x^2-8x+15}$$

$$2x^2+x-5$$

$$2x^3-6x^2$$

$$x^2-8x$$

$$x^2-3x$$

$$-5x+15$$

$$-5x+15$$

Remainder 0

Synthetic Division

−3	2	-5	-8	15
−		−6	−3	15
×	2	1	-5	0

Remainder

$2x^2+x-5$

Long Division

Review long division of polynomials.

$$(x^3-7x^2+11x+9)\div(x-4)$$

x^2-3x-1 → quotient

divisor ← $x-4$ | $x^3-7x^2+11x+9$ → dividend

$-x^3+4x^2$

$-3x^2+11x$

$+3x^2-12x$

add the opposite $-x+9$

$+x-4$

constant 5 → remainder

Division Statement

$$x^3-7x^2+11x+9=(x-4)(x^2-3x-1)+5$$

Synthetic Division

divide $2x^3+3x^2-4x+15$ by $x+3$

	$2x^3$	$3x^2$	$-4x$	15
	↓	↓	↓	↓
+3	2	3	−4	15
−				
×				

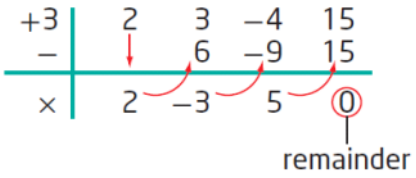
+3	2	3	−4	15
−	↓	6	−9	15

$P(x)=x^3-10x+6$ is divided by $x+4$

+4	1	0	−10	6
−	↓	4	−16	24
×	1	−4	6	−18

remainder

$$x^2-4x+6-\frac{18}{x+4}$$



$(2x^3 + 3x^2 - 4x + 15) \div (x + 3) = 2x^2 - 3x + 5$

Restriction: $x + 3 \neq 0$ or $x \neq -3$

Remainder Theorem

If a polynomial f(x) is divided by (x – a), the remainder is f(a).
f(x) = (x – a) Q(x) + f(a)

Factor Theorem

A polynomial f(x) has a factor (x – a) if and only if f(a) = 0.

MC Characteristics of Graphs Practice & KEY

Name : _____ Score : _____

Teacher : _____ Date : _____

Identify Polynomial Functions

Identify which graph represents the given polynomial function.

1) $y = -x^2 - 2x + 2$

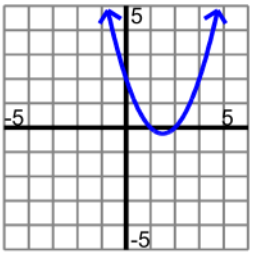
_____

Even degree

-a (negative leading coeff)

y-int (0, 2)

A)



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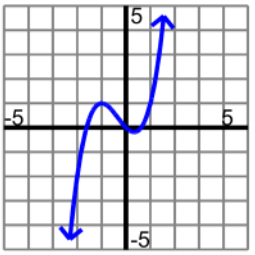

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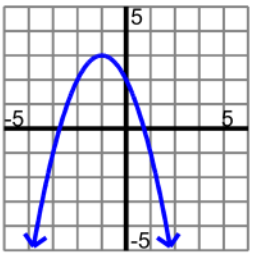

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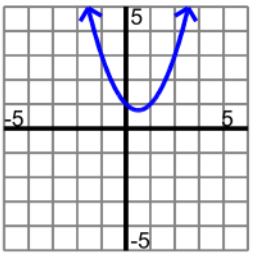
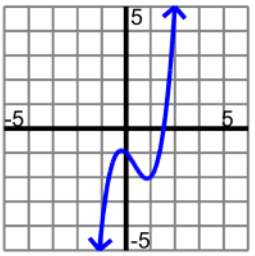


2) $y = 3x^2 + 2x + 2$

_____

A)



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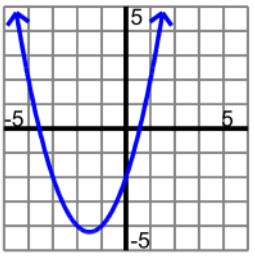

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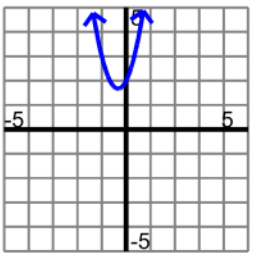

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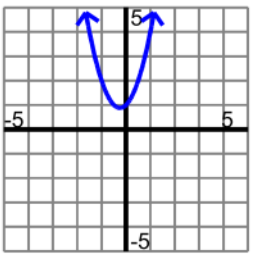

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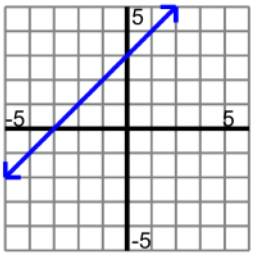
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

3) $y = -5x - 4$

_____

A)



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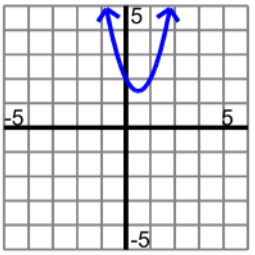

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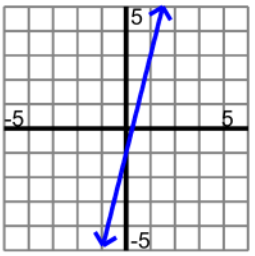

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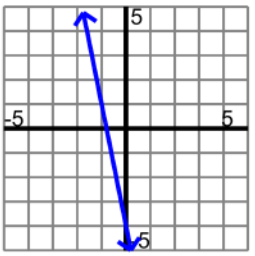


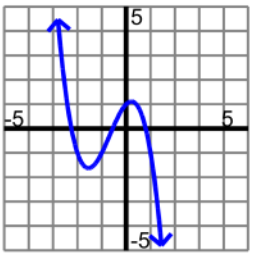
4) $y = -x^3 - 2x^2 + x + 1$

_____

ODD & $-a$ → A or B

$y - mt = 1$ → A

A)



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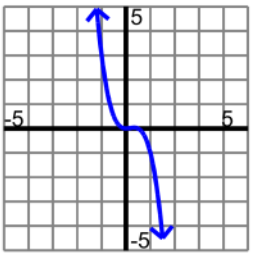

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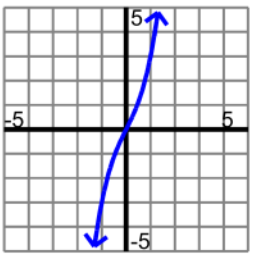

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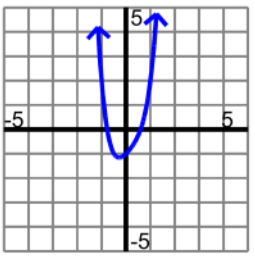

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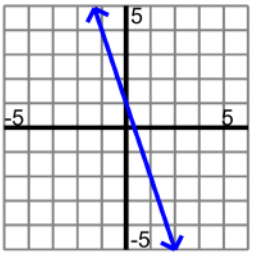
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

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

_____

A)



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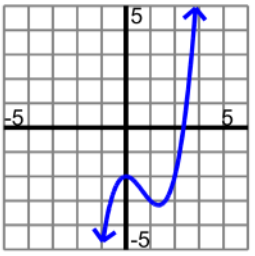

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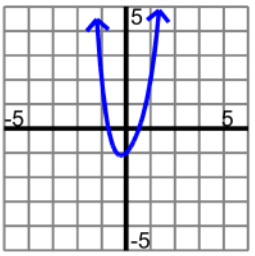

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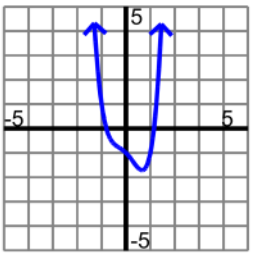

6) $y = 5x + 2$

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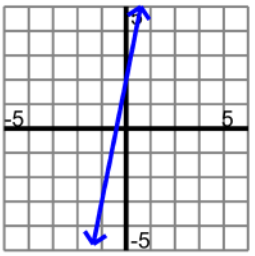
A)



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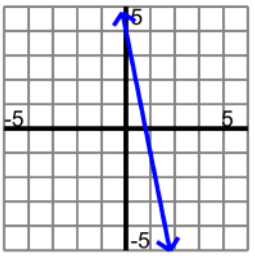

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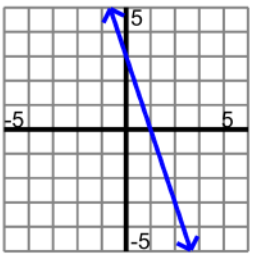

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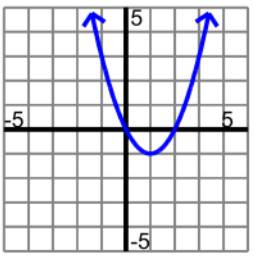

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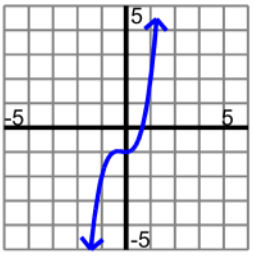
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

7) $y = -x^3 - x^2 + x + 2$

_____

A)



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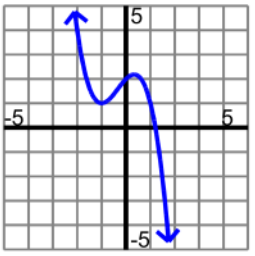

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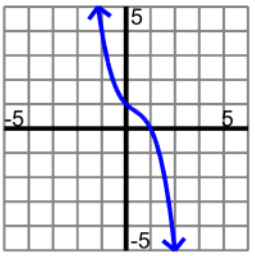

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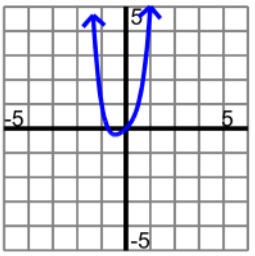
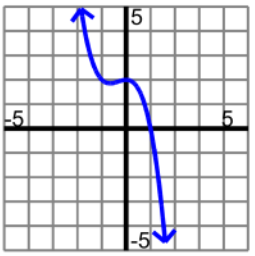


8) $y = x^3 + 2x - 1$

_____

A)



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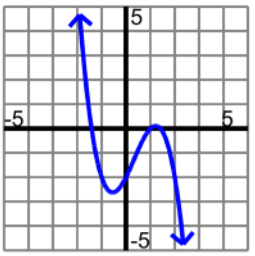

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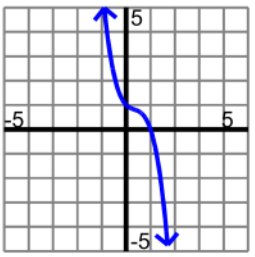

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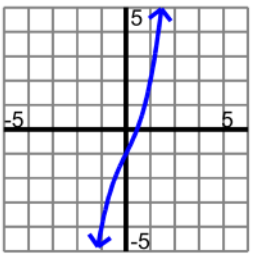

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Teacher : _____ Date : _____

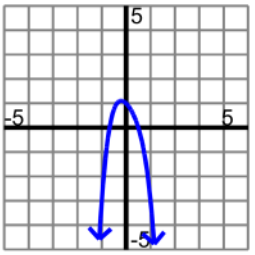
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

9) $y = -x^4 + x^3 - x^2 - 2x + 1$

_____

A)



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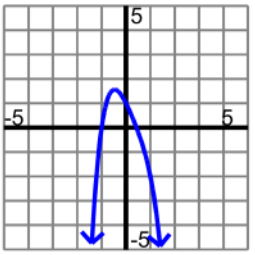

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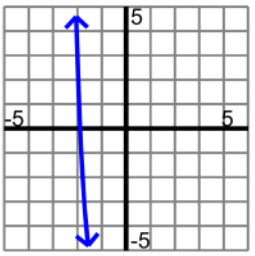

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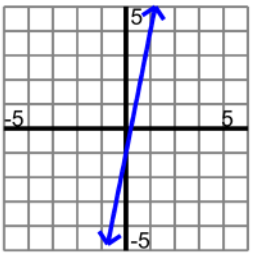
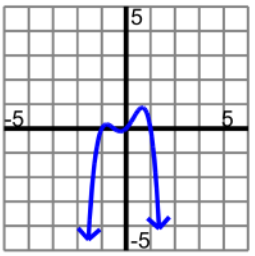


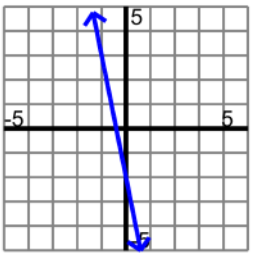
10) $y = x^4 - 2x^3 + 2x^2 + 1$

_____

A)



B)



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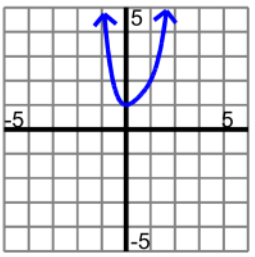
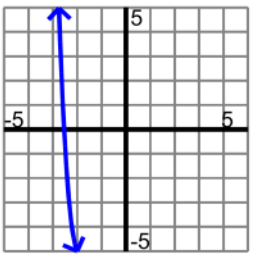


D)



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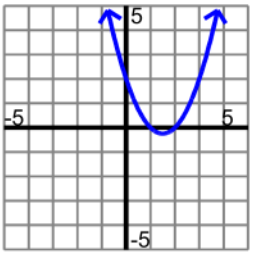
KEY

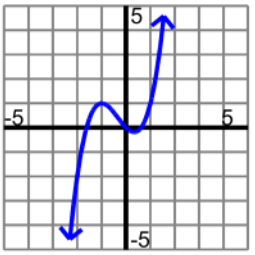
Identify Polynomial Functions

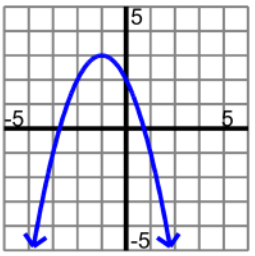
Identify which graph represents the given polynomial function.

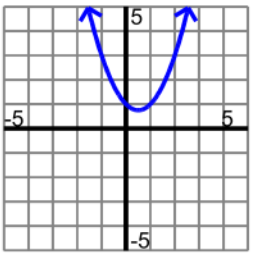
1) $y = -x^2 - 2x + 2$

C

A) 

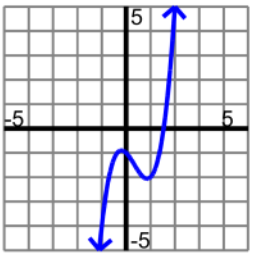
B) 

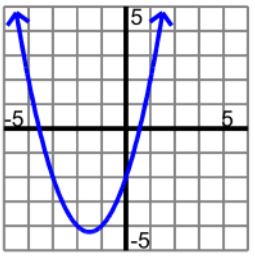
C) 

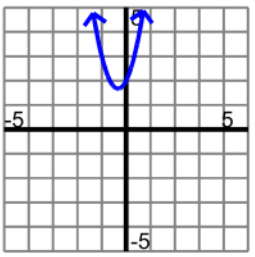
D) 

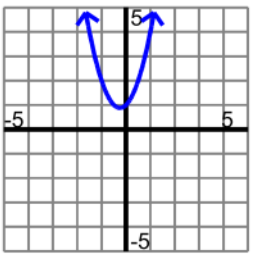
2) $y = 3x^2 + 2x + 2$

C

A) 

B) 

C) 

D) 

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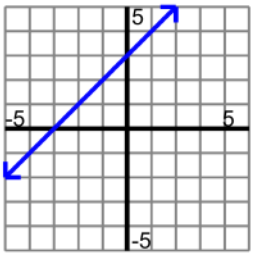
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

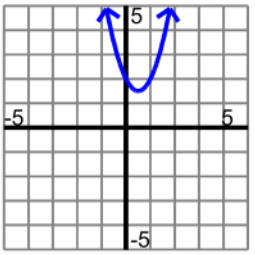
3) $y = -5x - 4$

D

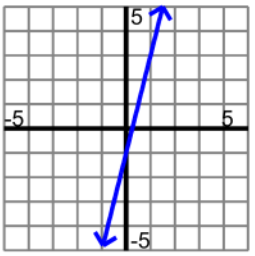
A)



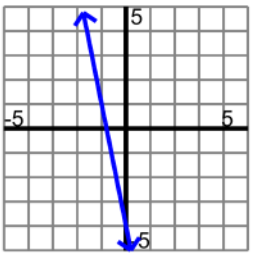
B)



C)



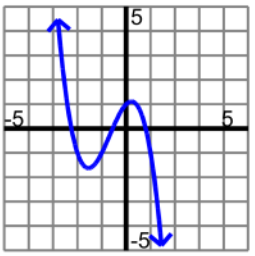
D)



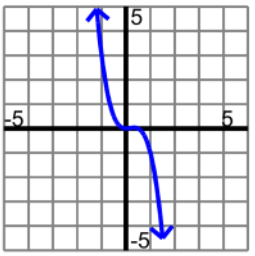
4) $y = -x^3 - 2x^2 + x + 1$

A

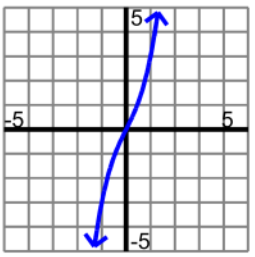
A)



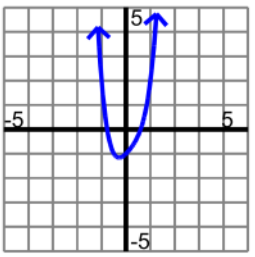
B)



C)



D)



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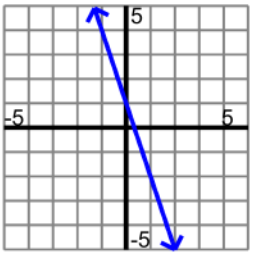
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

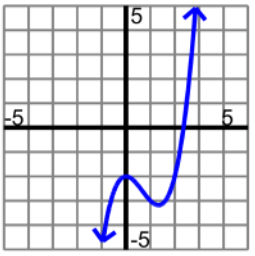
5) $y = x^3 - 2x^2 - 2$

B

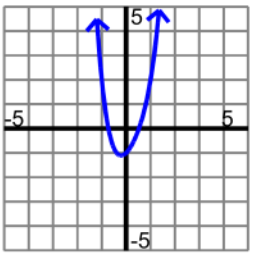
A)



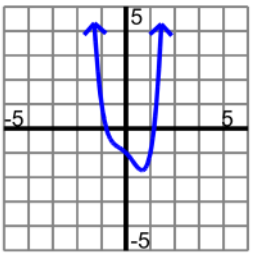
B)



C)



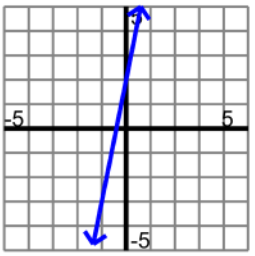
D)



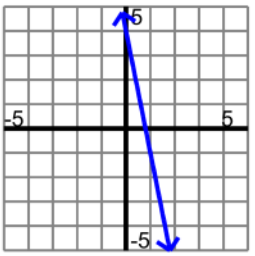
6) $y = 5x + 2$

A

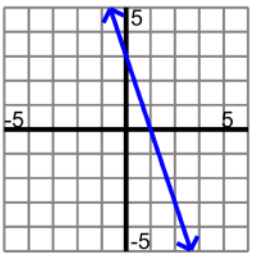
A)



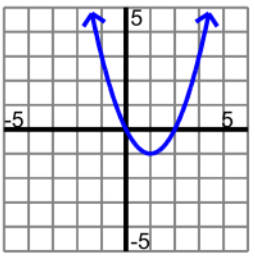
B)



C)



D)



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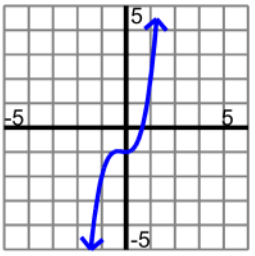
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

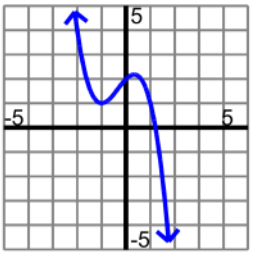
7) $y = -x^3 - x^2 + x + 2$

B

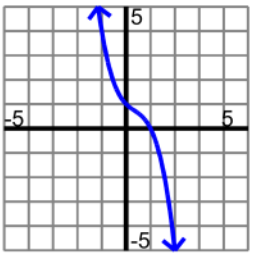
A)



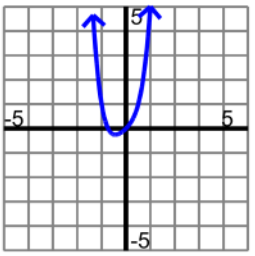
B)



C)



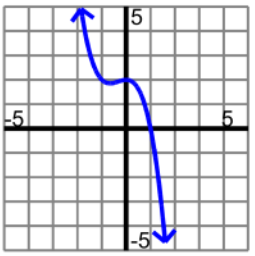
D)



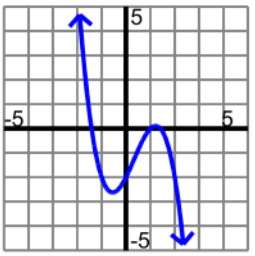
8) $y = x^3 + 2x - 1$

D

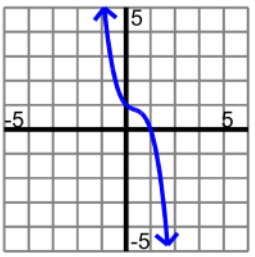
A)



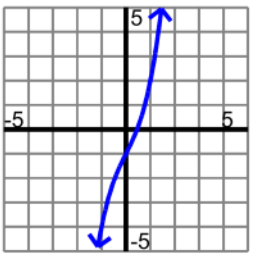
B)



C)



D)



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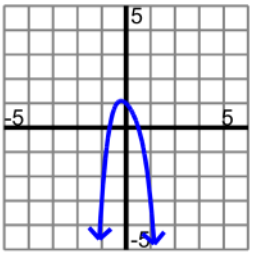
Identify Polynomial Functions

Identify which graph represents the given polynomial function.

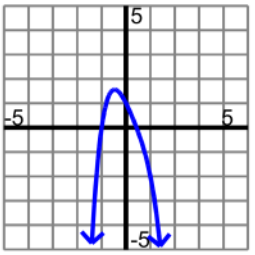
9) $y = -x^4 + x^3 - x^2 - 2x + 1$

B

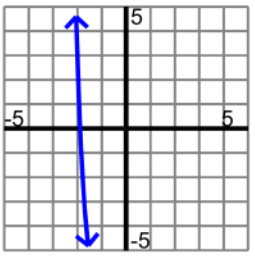
A)



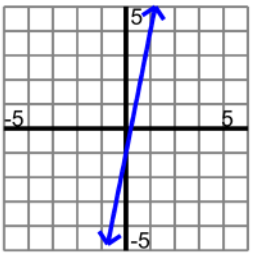
B)



C)



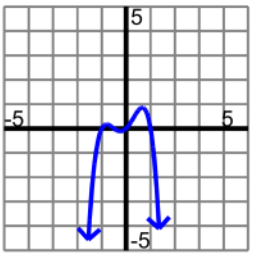
D)



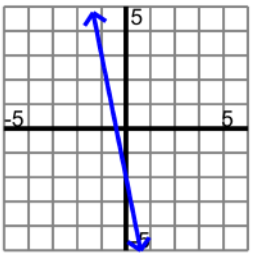
10) $y = x^4 - 2x^3 + 2x^2 + 1$

C

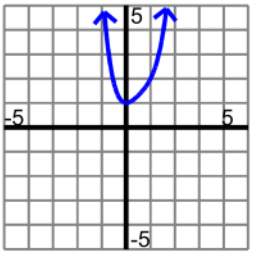
A)



B)



C)



D)