Math 3 Honors

Name_____ ID: 1

Unit 3 Test 1 Review

Date_____ Period____

Divide.

1) $(m^3 - 9m^2 - 16m + 64) \div (m - 10)$

10 | 1 −9 −16 64
↓ 10 10 −60
1 1 −6 4

$m^2 + m - 6 + \frac{4}{m-10}$

2) $(x^3 + 2x^2 + 6x + 22) \div (x + 3)$

−3 | 1 2 6 22
↓ −3 3 −27
1 −1 9 −5

$x^2 - x + 9 - \frac{5}{x+3}$

3) $(p^3 - 13p^2 + 48p - 40) \div (p - 7)$

7 | 1 −13 48 −40
↓ 7 −42 42
1 −6 6 2

$p^2 - 6p + 6 + \frac{2}{p-7}$

4) $(r^3 + 4r^2 - 24r + 71) \div (r + 8)$

−8 | 1 4 −24 71
↓ −8 32 −64
1 −4 8 7

$r^2 - 4r + 8 + \frac{7}{r+8}$

Evaluate each function at the given value using synthetic division and substitution. remainder Thm

5) $f(x) = 4x^4 + 13x^3 + 4x^2 - 16x + 4$ at $x = -2$

$4(-2)^4 + 13(-2)^3 + 4(-2)^2 - 16(-2) + 4$

12 ← So if f(x) was divide by x+2, 12 would be the remainder

6) $f(a) = -6a^4 - 16a^3 + 7a^2 + 4a$ at $a = -3$

$= -6(-3)^4 - 16(-3)^3 + 7(-3)^2 + 4(-3)$

−3

7) $f(x) = 2x^4 + 13x^3 + 23x^2 + 18x + 31$ at $x = -4$

$2(-4)^4 + 13(-4)^3 + 23(-4)^2 + 18(-4) + 31$

7

8) $f(m) = m^3 + 3m^2 - 20m - 12$ at $m = -6$

$(-6)^3 + 3(-6)^2 - 20(-6) - 12$

0 → so (m+6) is a factor of f(m) and m = −6 is a root of the function.

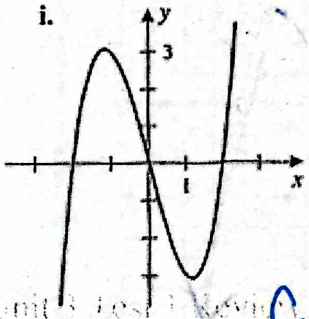
Unit 3 Test 1 Review
Math 3 Honors SP16

Name: KEY

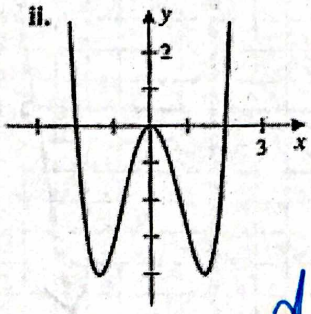
Polynomial Graphs

1. Match the equation with the graph.

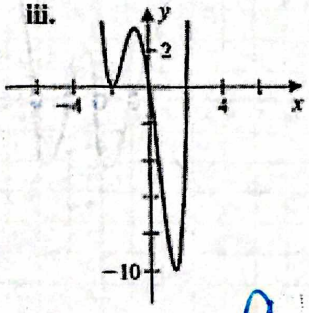
a. $y = x(x+2)^2(x-2)$ b. $y = x(x+2)(x-2)^2$ c. $y = x(x+2)(x-2)$ d. $y = x^2(x+2)(x-2)$

i. 

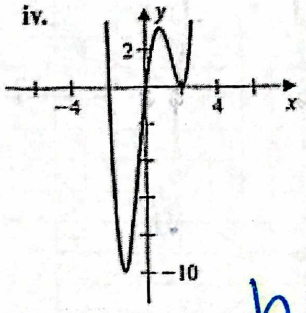
c

ii. 

d

iii. 

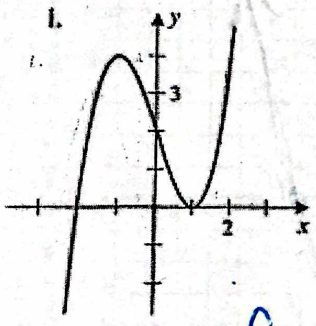
a

iv. 

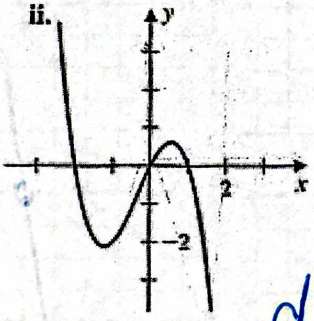
b

2. Match the equation with the graph.

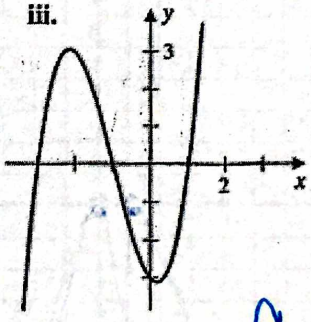
a. $y = (x-1)(x+1)(x+3)$ b. $y = x^2(x-2)$ c. $y = (x+2)(x-1)^2$ d. $y = x(x+2)(1-x)$

i. 

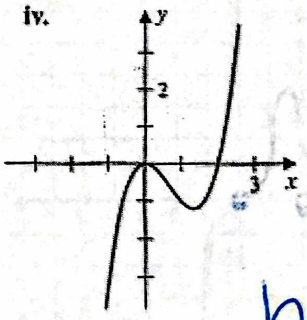
c

ii. 

d

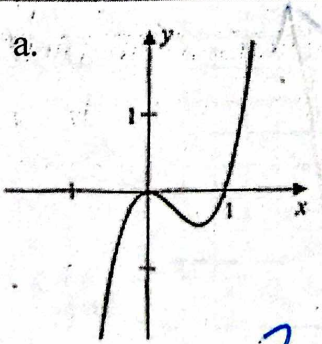
iii. 

a

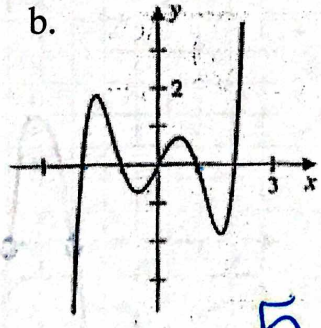
iv. 

b

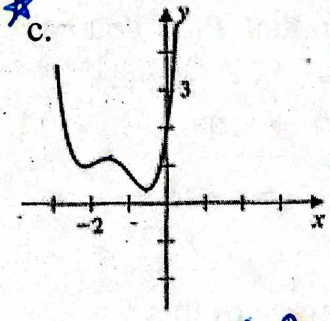
3. Determine the lowest possible degree for the polynomial whose graph is shown.

a. 

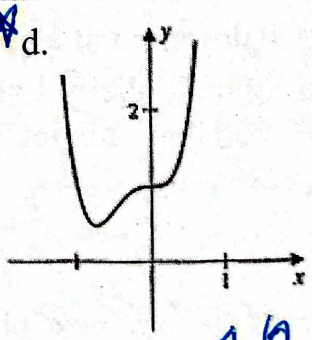
3

b. 

5

★ c. 

4 or 2

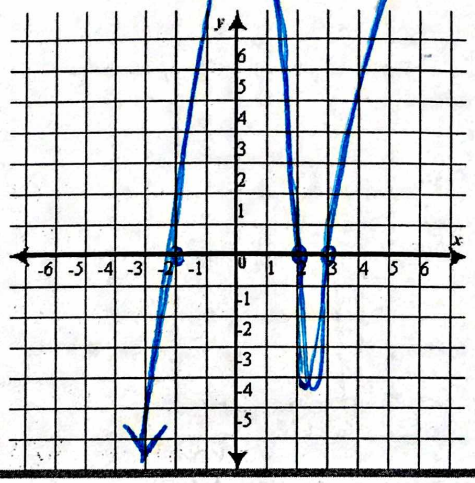
★ d. 

4 or 2

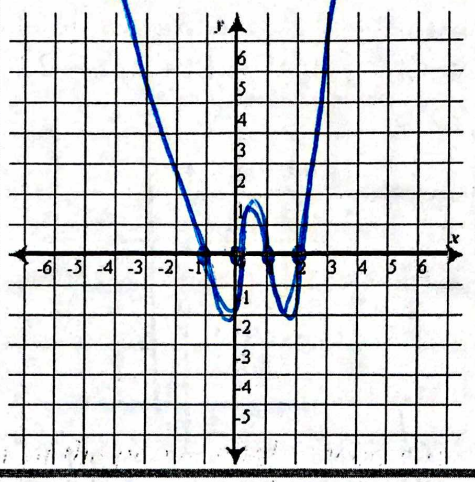
Use the zeros and the end behavior of the polynomial function to roughly sketch the graph.

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

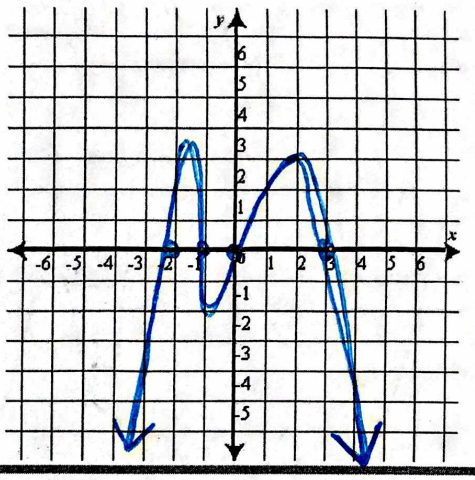
y-int: 12



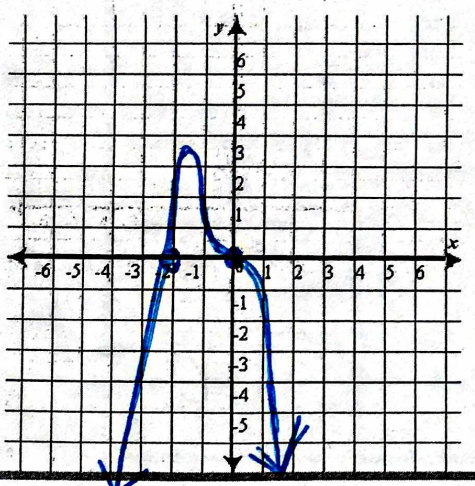
5. $f(x)=x(x+1)(x-1)(x-2)$



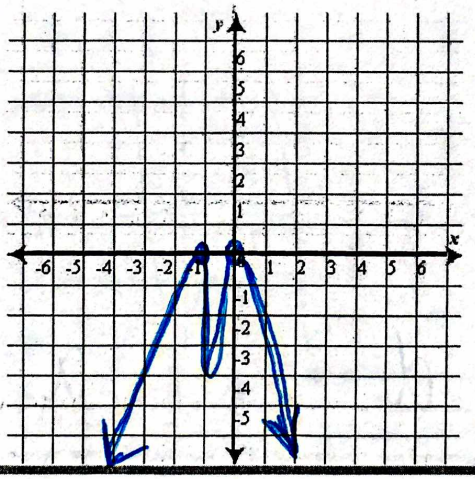
6. $f(x)=-x(x+1)(x+2)(x-3)$



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



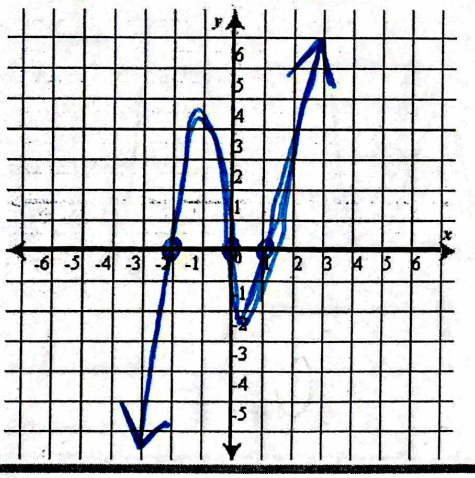
8. $f(x)=-x^2(x+1)^2$



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

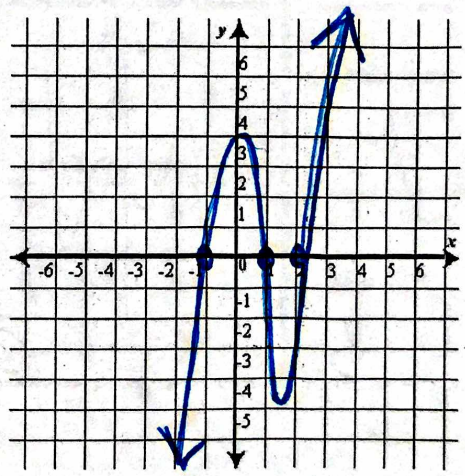
$x(x^2+x-2)$

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



10.

a. Sketch the graph of a polynomial $P(x)$ that has zeros of multiplicity 1 at $x=1$, $x=-1$ and $x=2$ and that satisfies $P(x)\to\infty$ as $x\to\infty$ and $P(x)\to-\infty$ as $x\to-\infty$.

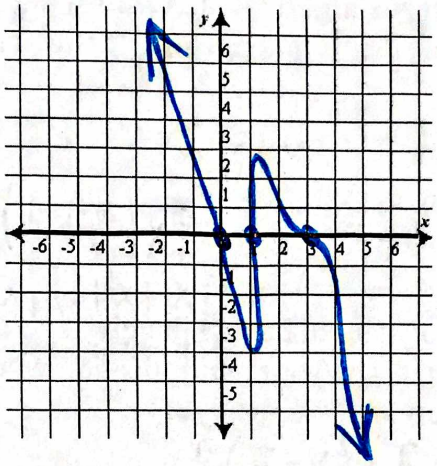


b. What is the least possible degree of this polynomial?

3

11.

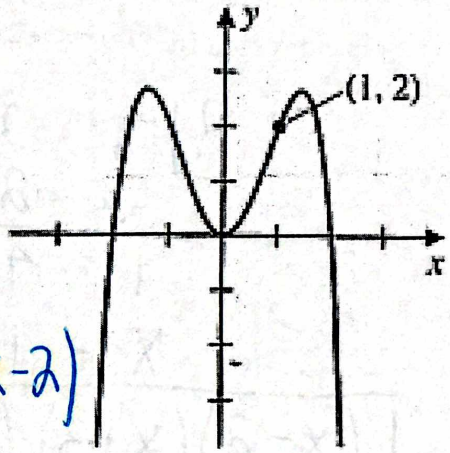
a. Sketch the graph of a polynomial $P(x)$ that has zeros of multiplicity 1 at $x=0$, $x=1$, has a zero of multiplicity 3 at $x=3$ and that satisfies $P(x)\to-\infty$ as $x\to\infty$ and $P(x)\to\infty$ as $x\to-\infty$.



b. What is the least possible degree of this polynomial?

5

12. Determine the polynomial of degree 4 whose graph is shown in the figure.



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

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

$2=3$

$y=\frac{-2}{3}x^2(x+2)(x-2)$

Polynomials

Put each polynomial in standard form, state its degree, leading term and whether it is a monomial, binomial, trinomial or polynomial (more than 4 terms).

	standard form	degree	leading term	classify # of terms
13. $10+3x^2-8x^3$	$-8x^3+3x^2+10$	3	$-8x^3$	trinomial
14. $5-8x-2x^3+2x^5+9x$	$2x^5-2x^3+x+5$	5	$2x^5$	polynomial

Perform the indicated operations. Put your answers in standard form.

Hint: Avoid the common mistake

15. $(6x^3-7x+8)-(3x^3-2)$

$3x^3-7x+10$

16. $x(2x)(x+3)$

$2x^2(x+3)$

$2x^3+6x^2$

17. $(x^2+2)^2$

$(x^2+2)(x^2+2)$

x^4+4x^2+4

Find the zeros algebraically, showing work if it is needed. Include the multiplicity of any multiple zeros. For example, if the zeros are 4, 4, 5, 6, then write "4 (mult. of 2), 5, 6."

18. $f(x) = (x+1)^2(x+7)$ -1 (mult. 2) -7 (mult. 1)

19. $f(x) = 4x^3 - 4x$ $= 4x(x^2-1)$ $4x(x+1)(x-1)$ 0 (mult. 1) -1 (mult. 1) 1 (mult. 1)

20. Write a polynomial having the given zeros, first in factored form, then multiply it out and put it in standard form. Show your multiplication work.

zeros: –2, and 3 with a multiplicity of 2

f(x)= $(x+2)(x-3)^2$ (factored form) f(x)= $x^3-4x^2-3x+18$ (standard form)

$(x+2)(x^2-6x+9)$

$x^3-6x^2+9x+2x^2-12x+18$

21. The volume of a box has a width of (x-2) inches. The volume is expressed as a product of the length of its dimensions and is expressed by $V(x) = x^3 + 2x^2 - 5x - 6$. Use synthetic division and the given width to completely factor V(x).

2	1	2	−5	−6
	↓	2	8	6
	1	4	3	0

$x^2 + 4x + 3$

$(x-2)(x+3)(x+1)$

3 | 1 | 3 | 4

22. Divide each using synthetic division.

$(x^3 - 8x^2 + 17x - 10) \div (x - 5) = x^2 - 3x + 2$

$(-2x^3 + 15x^2 - 22x - 15) \div (x - 3) = -2x^2 + 9x + 5$

$(x^3 + 2x^2 + 5x + 12) \div (x + 3) = x^2 - x + 8 - \frac{12}{x+3}$

$(x^4 - x^3 + x^2 - x + 1) \div (x - 1) = x^3 + x + \frac{1}{x-1}$

$(x^4 - 5x^3 + 5x^2 + 7x - 12) \div (x - 4) = x^3 - x^2 + x + 11 + \frac{32}{x-4}$

$(x^4 - 3x^2 + 10) \div (x - 2) = x^3 + 2x^2 + x + 2 - \frac{6}{x-2}$