

Practice 4.1-4.2

Name: \_\_\_\_\_

1. Write a polynomial function in standard form with roots:  $2 - 3i$ ,  $1$ , and  $-1$ . The lead coefficient is  $-2$ . Sketch the graph, including the y-intercept.  $\rightarrow 2+3i$  is also a root

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

$x$	$-2$	$3i$
$x^2$	$-2x$	$3ix$
$-2$	$-2x$	$4$
$-3i$	$-3ix$	$6i$
		$9$

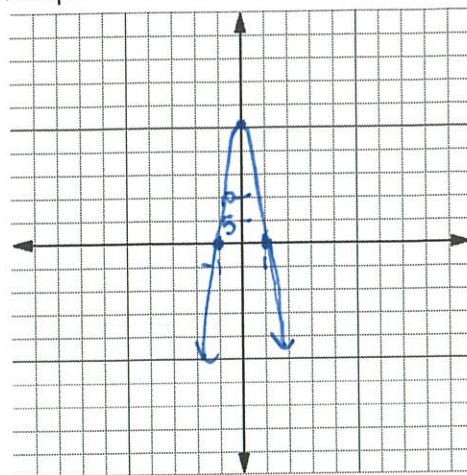
$(x^2 - 4x + 13)$

$x^2$	$-4x$	$13$
$x^4$	$-4x^3$	$13x^2$
$-1$	$-x^2$	$4x$
		$-13$

$x^4 - 4x^3 + 12x^2 + 4x - 13$

$\cdot -2$

$= -2x^4 + 8x^3 - 24x^2 - 8x + 26$



2. Write the equation for the graph below. Assume the lead coefficient is 3 and identify the coordinate of the y-intercept.

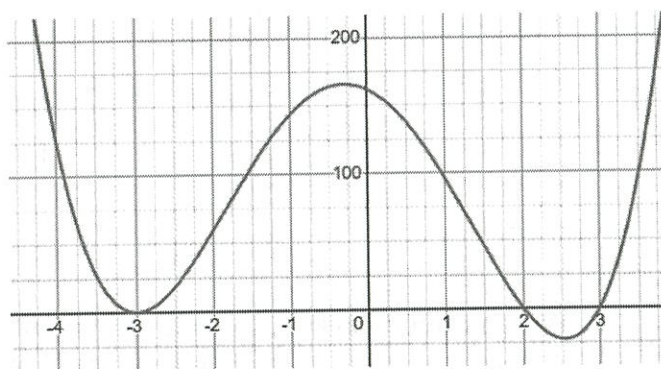
$3(x+3)^2(x-2)(x-3)$

y-intercept: plug in 0 for x

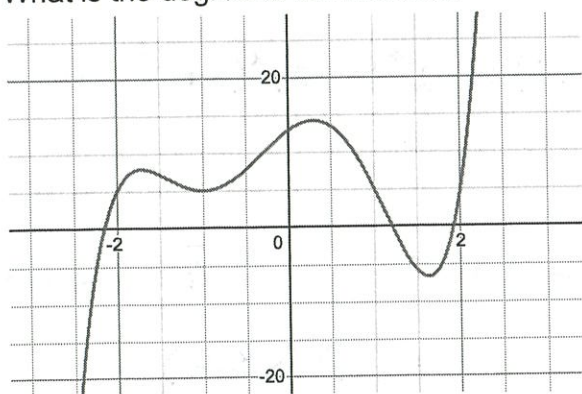
$3(0+3)^2(0-2)(0-3)$

$3 \cdot 3 \cdot 3 \cdot -2 \cdot -3$

$= 162$



3. What is the degree of the function?



odd degree, at least 5  
(too bumpy to be deg 3)  
(ends go in different directions,  
so odd degree)

4. Determine the degree of the function given the sequence

1, 7, 23, 55, 109, 191, 307, 463

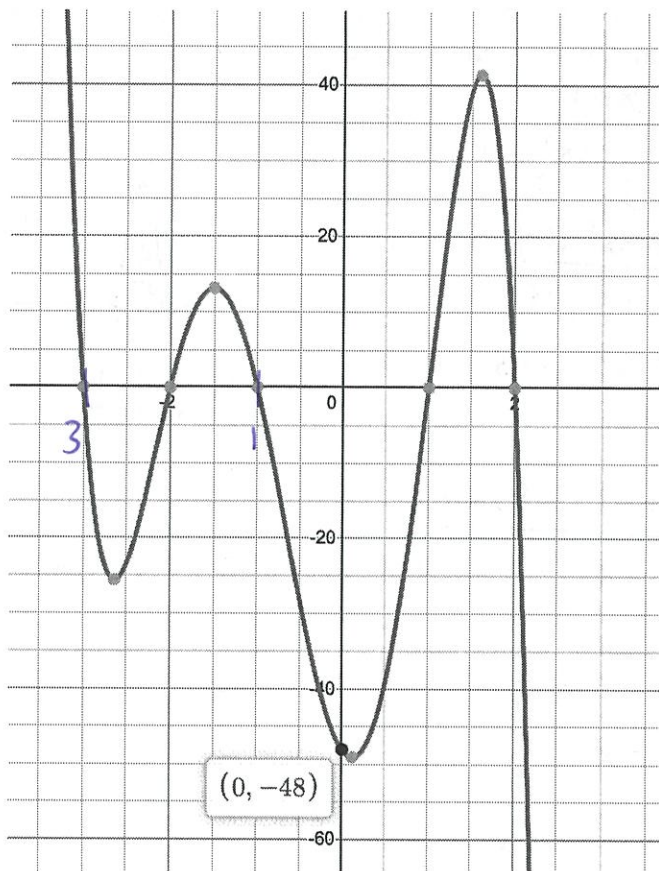
$+6$   $+16$   $+32$   $54$   $82$   $116$   $156$

$10$   $16$   $22$   $28$   $34$   $40$

$6$   $6$   $6$   $6$   $6$

degree 3 because of  
constant 3rd difference

5. Write an equation in factored form for the graph below.  $a \neq 1$



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

y-intercept: plug in  $x=0$

$$a(3)(2)(1)(-1)(2)$$

$$= a \cdot 12$$

from graph:  $-48$

$$\frac{-48}{12} = \frac{a \cdot 12}{12}$$

$$-4 = a$$

$$\boxed{-4(x+3)(x+2)(x+1)(x-1)(x-2)}$$

6. Write an equation in factored form of a polynomial function with complex roots at  $4i$  and  $-3i$  a triple root at  $2$ , a double root at  $-2$ , and single roots at  $-10$  and  $-1$ . The lead coefficient is  $a = -1$ .

and  $3i$

and  $-4i$

$$-(x-4i)(x+4i)(x+3i)(x-3i)(x-2)^3(x+2)^2(x+10)(x+1)$$

7. Find the remaining roots of the function  $h(x) = x^3 + 5x^2 - 4x - 20$  given that  $x = -5$  is a root.

	$x^2$	$0x$	$-4$
$x$	$x^3$	$0x^2$	$-4x$
$5$	$5x^2$	$0x$	$-20$

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

$$= (x+5)(x+2)(x-2)$$

roots:  $-5, -2, 2$

8. Is the following function even, odd, or neither?  $f(x) = -x^3 + 2$

neither

example:  $f(1) = -(1)^3 + 2 = 1$

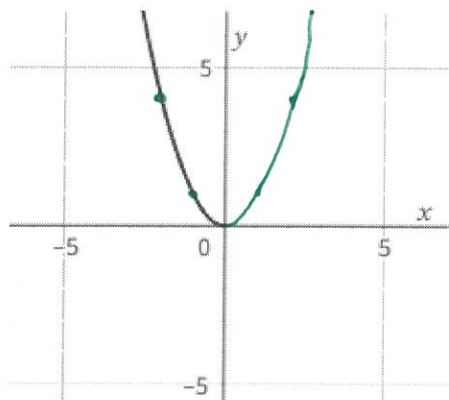
$$f(-1) = -(-1)^3 + 2 = 3$$

$f(1) \neq f(-1)$ , so not even

$f(-1) \neq -f(1)$ , so not odd

9a.

Finish the graph if it is an even function.



9b.

Finish the graph if it is an odd function.

