Chapter 7

Polynomial Models

Lesson 7-2 (pp. 446-452)

Mental Math

a. $x = 0, 7$

b. $y = -9, \frac{7}{3}$

c. $z = -15, -8, 5$

Activity

Step 1

	A	B	C	D
1	0			
2	1			
3	2			
4	3			
5	4			
6	5			

A1 0

Step 2

	A	B	C	D
1	0	-8		
2	1	-7		
3	2	12		
4	3	67		
5	4	176		
6	5	357		

B1 $=3\cdot a1^3-2\cdot a1-8$

Step 3

271; The formula in cell C7 would reference cell B8, which is empty.

	A	B	C first	D
1	0	-8	1	
2	1	-7	19	
3	2	12	55	
4	3	67	109	
5	4	176	181	
6	5	357	271	

C6 $=b7-b6$

Step 4 90

	B	C first	D second
1	0	-8	1	18
2	1	-7	19	36
3	2	12	55	54
4	3	67	109	72
5	4	176	181	90
6	5	357	271	

D5 $=c6-c5$

Step 5 The third set of differences is constant.

	C first	D second	E third
1	-8	1	18	18
2	-7	19	36	18
3	12	55	54	18
4	67	109	72	18
5	176	181	90	
6	357	271		

E4 $=d5-d4$

Guided Example 1

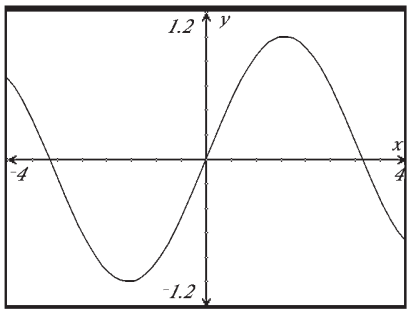
6; 10; 15; 21;

4; 5; 6;

1; 1

Questions

1. a. $T(7) = T(6) + t(7) = 56 + 28 = 84$
   b. $T(7) = \frac{1}{6}(7)^3 + \frac{1}{2}(7)^2 + \frac{1}{3}(7) = 84$
2. 7
3. The x-values must form a sequence of consecutive terms of an arithmetic sequence.
4. yes; 3
5. no
6. $f(x) = -x^3 + 21x^2 - 147x + 343$
7. a. 3
   b. $f(x) = 2x^3 - x^2 + 8x$
   c. 693
8. a.



$y = \sin x$

b. $-\pi \le x \le \pi$

9. 161.2; 376.4; 718.8; 1217.2
116.8; 215.2; 342.4; 498.4
98.4; 127.2; 156.0; $a = 194.6$; $b = 571$;
$c = 1289.8$; $d = 2507$; $n = 4$

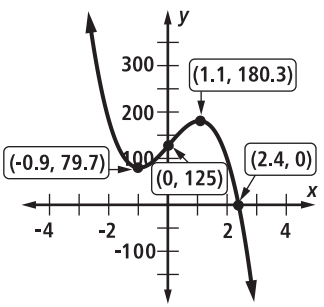
10. a. $f(1) = a + b + c + d$; $f(2) = 8a + 4b + 2c + d$; $f(3) = 27a + 9b + 3c + d$; $f(4) = 64a + 16b + 4c + d$; $f(5) = 125a + 25b + 5c + d$; $f(6) = 216a + 36b + 6c + d$
b. 1st differences: $7a + 3b + c$; $19a + 5b + c$; $37a + 7b + c$; $61a + 9b + c$; $91a + 11b + c$
2nd differences: $12a + 2b$; $18a + 2b$; $24a + 2b$; $30a + 2b$
3rd differences: $6a$, $6a$, $6a$

11. a. Let $n = 1, 2, 3$. $f(n) = \frac{3}{2}n^2 - \frac{3}{2}n + 1$; $f(1) = 1 = T(1)$; $f(2) = 4 = T(2)$; $f(3) = 10 = T(3)$
b. $f(4) = 19 \neq T(4)$

12. a. $I(4) = 1$; $I(5) = 5$; $I(6) = 15$; $I(7) = 35$; $I(8) = 70$; $I(9) = 126$
b. $I(n) = \frac{1}{24}n^4 - \frac{1}{4}n^3 + \frac{11}{24}n^2 - \frac{1}{4}n$

13. $f(x)$ has no relative extrema.

14. a.

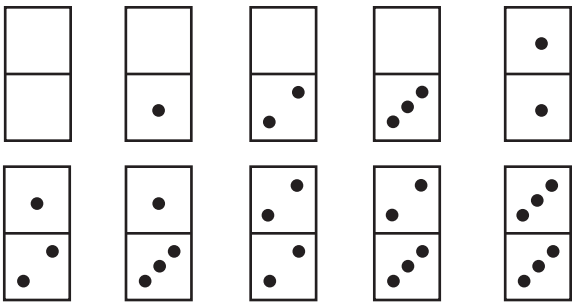


b. $x < 2.4$
c. $x > 2.4$
d. $-0.9 < x < 1.1$
e. $x < -0.9$ and $x > 1.1$

15. a. $P(n) = 141{,}400{,}000(0.995)^n$
b. 132.5 million
c. 2032

16. a. $4x^2 + 12x$
b. $4x^2 + 7x - 15$
c. $2x^3 + 10x^2 + 7x - 15$
d. $2x^4 + 4x^3 - 23x^2 - 36x + 45$

17. a.



b.

n	L
1	3
2	6
3	10
4	15
5	21
6	28

c. $L = \frac{1}{2}n^2 + \frac{3}{2}n + 1$