Name____ Date__________

4.7 Extra Practice

In Exercises 1–4, describe the transformation of *f* represented by *g*. Then graph each function.

1. $f(x) = x^4; g(x) = x^4 - 9$

2. $f(x) = x^5; g(x) = (x + 1)^5 + 2$

3. $f(x) = x^6; g(x) = -5(x - 2)^6$

4. $f(x) = x^3; g(x) = \left(\frac{1}{2}x\right)^3 - 4$

In Exercises 5 and 6, write a rule for *g* and then graph each function. Describe the graph of *g* as a transformation of the graph of *f*.

5. $f(x) = x^3 + 8; g(x) = f(-x) - 9$

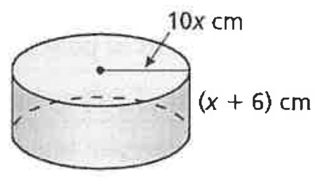
6. $f(x) = 2x^5 - x^3 + 1; g(x) = 5f(x)$

In Exercises 7 and 8, write a rule for *g* that represents the indicated transformation of the graph of *f*.

7. $f(x) = x^3 - 6x^2 + 5$; translation 1 unit left, followed by a reflection in the x-axis and a vertical stretch by a factor of 2

8. $f(x) = 3x^4 + x^3 + 3x^2 + 12$; horizontal shrink by a factor of $\frac{1}{3}$ and a translation 8 units down, followed by a reflection in the y-axis.

9. Write a function V for the volume (in cubic centimeters) of the cylinder shown. Then write a function W that represents the volume (in cubic centimeters) of the cylinder when x is measured in millimeters. Find and interpret $W(2)$.



Name____ Date__________

4.8 Extra Practice

In Exercises 1 and 2, graph the function.

1. $h(x) = -\frac{1}{3}(x + 1)(x - 2)^2$

2. $k(x) = (x + 3)(x^2 - 2x + 2)$

In Exercises 3 and 4, find all the real zeros of the function.

3. $f(x) = 2x^3 + 11x^2 + 2x - 15$

4. $p(x) = 6x^4 + 34x^3 - 45x^2 + 74x - 21$

In Exercises 5–8, graph the function. Identify the *x*-intercepts and the points where the local maximums and local minimums occur. Determine the interval for which the function is increasing or decreasing.

5. $f(x) = 4x^3 - 12x^2 - x + 15$

6. $g(x) = 2x^4 + 5x^3 - 21x^2 - 10x$

7. $k(x) = x^3 - 2x$

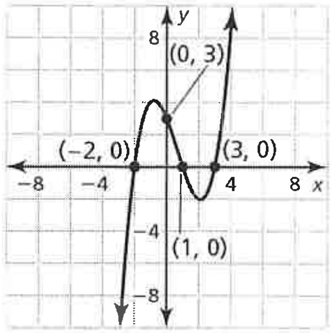
8. $f(x) = x^4 - 29x^2 + 100$

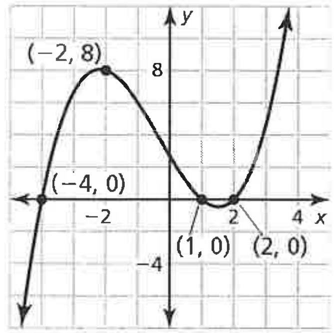
9. Write and graph a polynomial function that has one real zero in each of the intervals $-4 < x < -3, -1 < x < 0$, and $2 < x < 3$. Is there a maximum degree that such a polynomial function can have? Justify your answer.

Name______________________________ Date__________

4.9 Extra Practice

In Exercises 1–4, write a cubic function whose graph passes through the given points.

1. 

2. 

3. $(-6, 0), (-5, 0), (4, 0), (5, 110)$

4. $(-1, 0), (0, 36), (3, 0), (6, 0)$

In Exercises 5–8, use finite differences to determine the degree of the polynomial function that fits the data. Then use technology to find the polynomial function.

5.

x	−2	−1	0	1	2	3
f(*x*)	−14	−6.5	0	5.5	10	13.5

6.

x	−2	−1	0	1	2
f(*x*)	30	4	0	0	−14

7. (0, 0), (2, 0), (4, 40), (6, 168), (8, 432), (10, 880)

8. (0, 10), (1, 10), (2, 18), (3, 64), (4, 202), (5, 510)

9. The table shows the population *y* (in thousands) of bacteria after *x* hours. Find a model for the data. Use the model to estimate the population of the bacteria after 2 hours.

x	0.5	1	2.5	3	4	4.5
y	5.125	6	20.625	32	69	96.125

10. The table shows the value *y* (in hundreds of dollars) of an autographed jersey of a professional football player, where *x* represents the number of years since 2010. Find a model for the data. Use the model to estimate the year that the jersey will be valued at $500,000.

x	1	2	3	4	5
y	6	34	162	510	1246