Pre-Calculus Name: Date: Period:

Unit 3 Practice Test
Learning Targets: 3A-3D

Complete the problems below, show your work, and write your answer in the blank provided.

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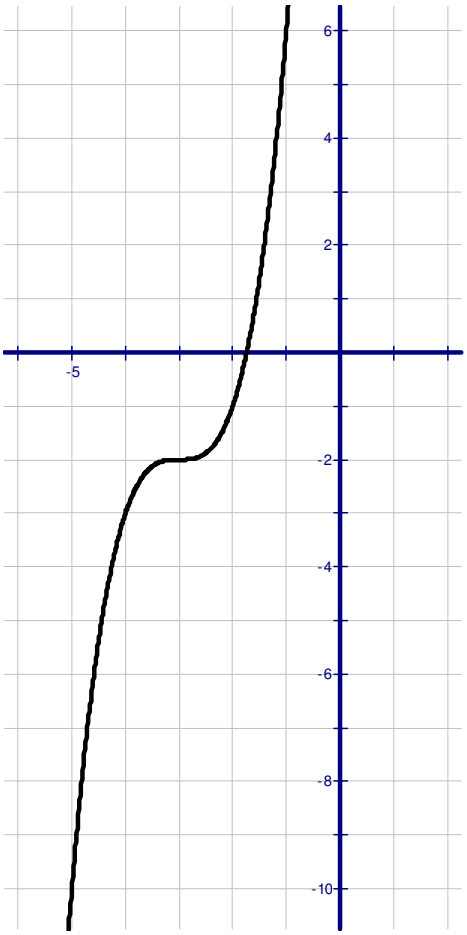
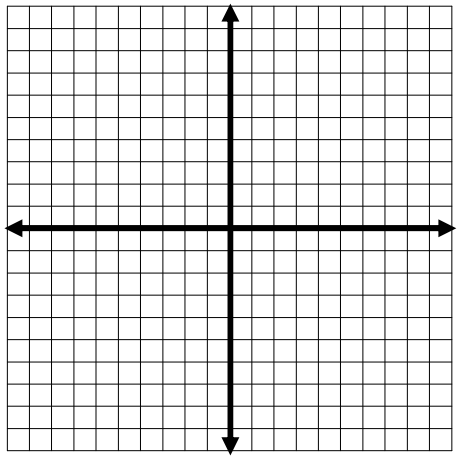
Target 3A – No Calculator
I can represent and apply power functions, with integer and rational powers, as equations and graphs.

1. Find the values of m and n that would produce the graph to the right in the function $f(x) = (x - m)^3 + n$.

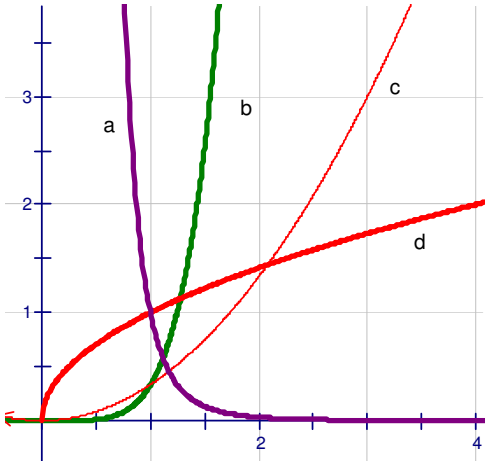


2. A certain power function of the form $f(x) = k\,x^a$ for some integer a. The graph contains the point (0,0) and the rest of the graph is in quadrant II and quadrant IV.

3. Graph $y = 2x^{1/3}$



4. Which graph(s) below would have an equation of the form $y = x^{1/n}$ for some integer n?



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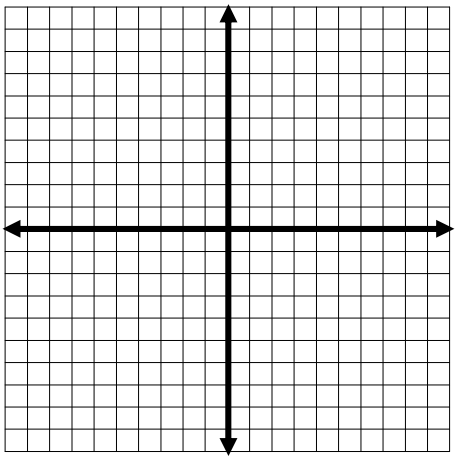
Target 3B

I can identify the extrema, symmetry, and zeros of polynomial functions and use them to graph and model with these functions.

5. Write the function $f(x) = x^3 - 7x - 6$ in completely factored form using your calculator, synthetic division and/or factoring.

6. Sketch a complete graph of the function $f(x)$. List the exact coordinates of the x-intercepts, y-intercepts, and zeros.



7. Consider the function $g(x) = x^4 + x^3 - 4x^2 + 2x - 12$.
   a. Completely factor $g(x)$.

   b. Find all the zeros (real and imaginary) for $g(x)$.

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Target 3C

I can describe and apply the Fundamental Theorem of Algebra to find real and complex solutions of polynomial equations

8. What is the fundamental theorem of Algebra?

9. Use your calculator to find the approximate real solutions to the equation

$$2x^4 - 3x^3 + 2 = 0$$

Are there any complex solutions to this equation (you don't need to find them if there are)? If so, how many? Explain how you know.

Solve the equations. You may use your calculator (to start), synthetic division, factoring, or the quadratic formula. Leave answers as exact answers in simplified form.

10. $x^3 + x^2 - 4\,x - 4 = 0.$

11. $x^3 - 3\,x^2 = -5\,x + 15$

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Target 3D – No Calculator

I can graph rational functions and identify their asymptotes.

12. Consider $g(x) = \frac{2x^2-5x-3}{x^2-2x-3} = \frac{(x-3)(2x+1)}{(x-3)(x+1)}$

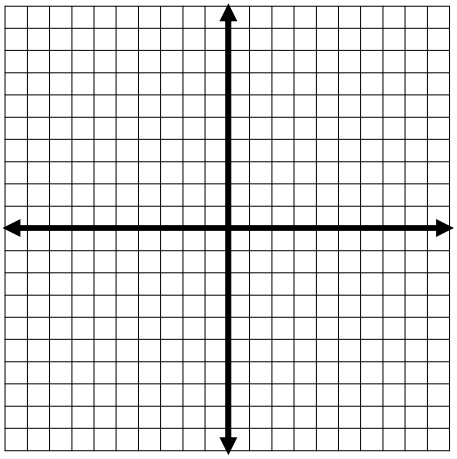
a. State the domain of $g(x)$.

b. Find the hole(s) in the graph and write your answer(s) as an equaion.

c. Determine the roots (or zeros) of the function and write them as ordered pairs.

d. Determine the vertical asymptote(s) and write the equations of the asymptote(s).

e. Graph the function, its roots, and its asymptotes (as dotted lines). Be sure and indicate any holes in the graph. Label your graph.



Applications

13. Use the table below to find a *power regression* model and predict the value of the function when $x = 20$.

x	1	2	3	4	5	6	7	8	9
y	1.5	1.8	2.5	3.1	3.3	3.8	3.7	4.2	4.5

14. Use the table below to find a *Cubic regression* model and predict the value of the function when $x = 10$.

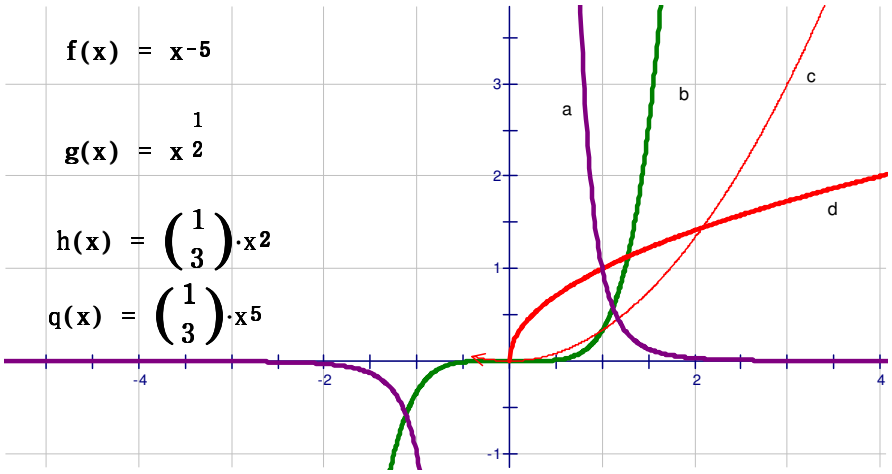
x	1	2	3	4	5	6
y	.2	1.7	7.2	15.3	36.2	53.7

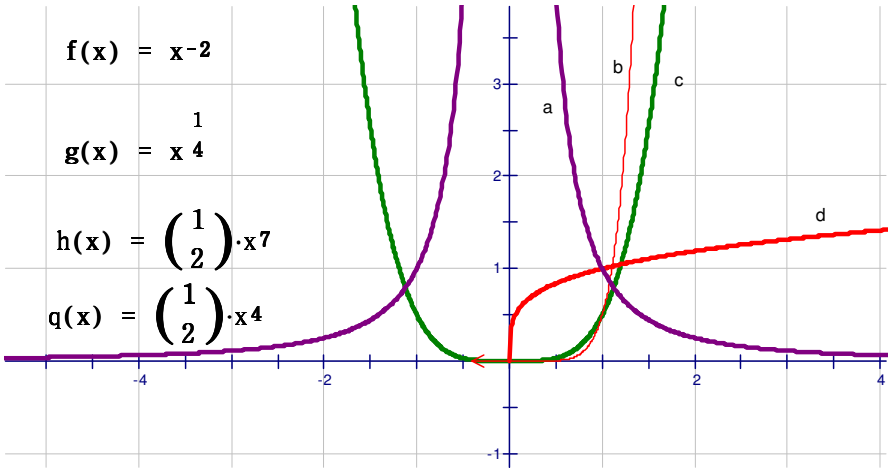
15. Compare the functions $f(x) = \frac{x^2+5x+6}{x+3}$ and $g(x) = x + 2$. (3D)
    a) Are the domains equal? Explain.

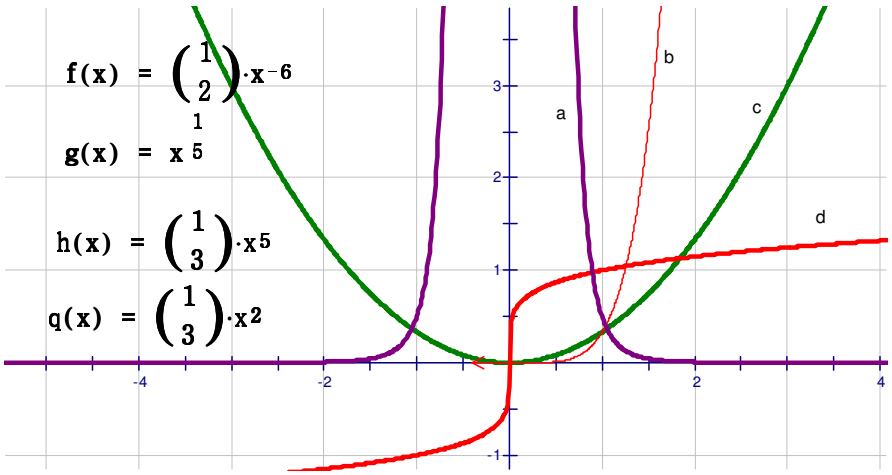
    b) Does f have a vertical asymptote? Explain.

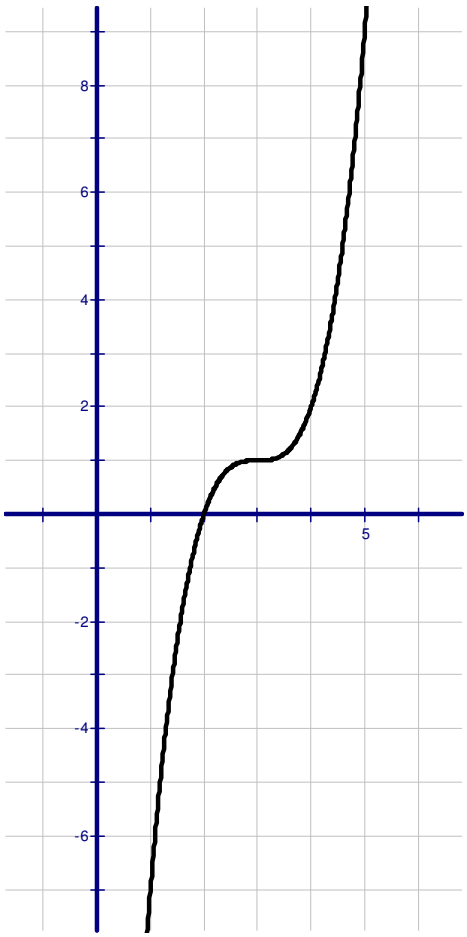
    c) Explain why the graphs appear to be identical.

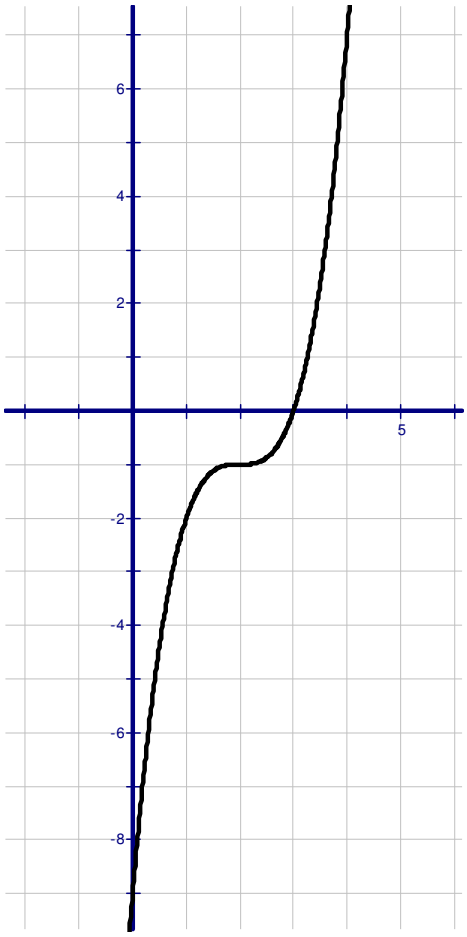
    d) Are the functions identical? Explain.

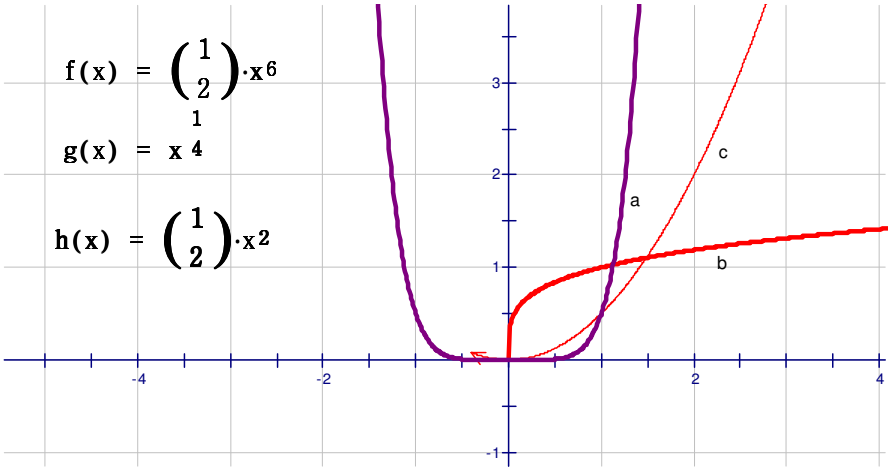

f(x) = x^-5
g(x) = x^(1/2)
h(x) = (1/3)·x^2
q(x) = (1/3)·x^5
a
b
c
d

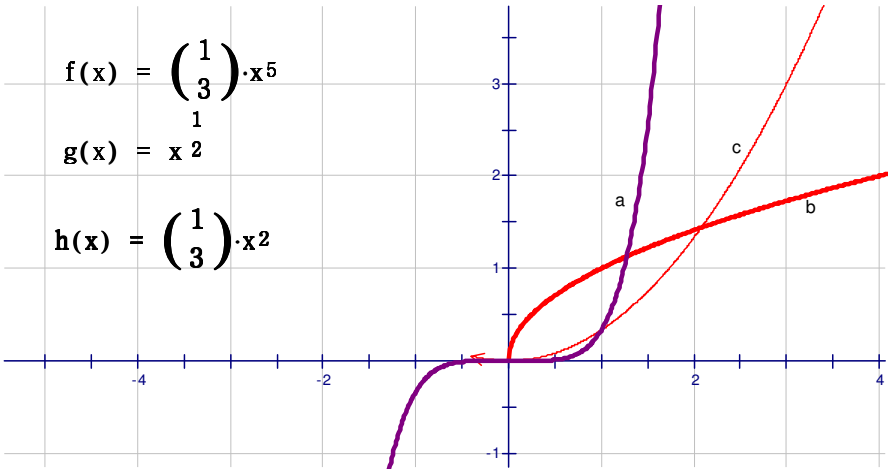

f(x) = x^-2
g(x) = x^(1/4)
h(x) = (1/2)·x^7
q(x) = (1/2)·x^4
a
b
c
d


f(x) = (1/2)·x^-6
g(x) = x^(1/5)
h(x) = (1/3)·x^5
q(x) = (1/3)·x^2
a
b
c
d


8
6
4
2
5
-2
-4
-6


6
4
2
5
-2
-4
-6
-8


f(x) = (1 2)·x^6
g(x) = x^(1/4)
h(x) = (1 2)·x^2
3
2
1
-1
-4
-2
2
4
a
b
c



Solutions:

3. $g(x) = (x-2)(x+3)(x^2+2)$
zeros: $x = \{2, -3, \pm 2i\}$

4. $y = (x-4)\left(x-\frac{1}{2}\right)(x^2+4)$