

# Algebra Review

Below is a list of topics and practice problems you have covered so far this semester. You do not need to work out every question on the review. Skip around and work the types of questions you've struggled with or don't remember. You also should look at your notes and old tests & quizzes to see what material you don't remember or struggled with. The entire test will be non-calculator. If you are absent, you will need to arrange a time with your partner by Thursday 10/18.

## Unit 1 Polynomials

Factoring

Polynomial operations (add, subtract, multiply and divide with synthetic and long division)

Even/Odd functions (regarding symmetry of the graph)

Identifying the degree of a polynomial

Domain and Range of parent functions

Piecewise functions

Graphing a polynomial (multiplicity of zeros and end behavior)

End behavior (limit notation)

Relative (local) extrema

Intervals where a graph is increasing/decreasing

## Unit 2 Inequalities and Rational Functions

Finding a composition of two functions, using values and variables

Verifying if two functions are inverses of one another

Using a sign chart for polynomial inequalities

Finding asymptotes, intercepts and removable discontinuities for rational functions

Graphing rational functions

Finding where graphs are discontinuous

Rational inequalities

## Unit 3 Logarithms and Exponential Functions

Rewriting exponents and logs (including natural log)

Exponent rules (including negative and fraction exponents)

Condensing and expanding logs

Solving log and exponential equations

Log and exponential graphs (including domain for log functions)

## Unit 1 Polynomials

Factor

1.  $x^2y^6 - 16$

2.  $x^4 + 2x^2 - 3$

3.  $x^3 - 2x^2 - 9x + 18$

4.  $3x^3 + 24$

5. Simplify  $(x-2)^2 - (x+3)(x-3)$

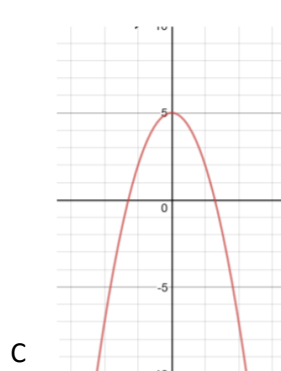
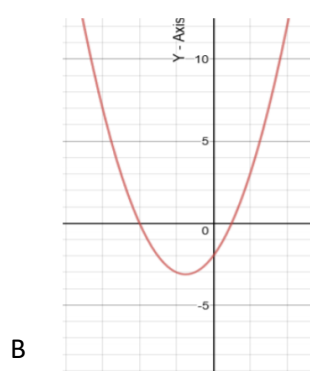
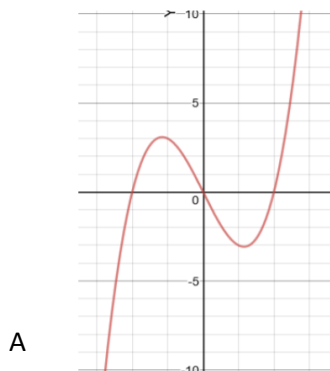
Find the quotient and remainder using synthetic division or long division

6.  $\frac{x^4 - 2x^2 - 3x + 1}{x - 2}$

7.  $\frac{x^3 + 2x^2 - 2x + 4}{x + 3}$

Determine if the function is even, odd, or neither in regards to symmetry.

10.



D.  $f(x) = \frac{x-2}{x^2-4}$

E.  $f(x) = 2x$

F.  $f(x) = 4x^2$

G.  $f(x) = \sqrt{3x-2}$

Find the degree and end behavior of the polynomial

9.  $f(x) = x^5 - 7x^3 + x^2 - 2$

10.  $f(x) = x(x-2)^3(x-2)^2$

11.  $f(x) = -2x^4 - 7x^2 + x - 2$

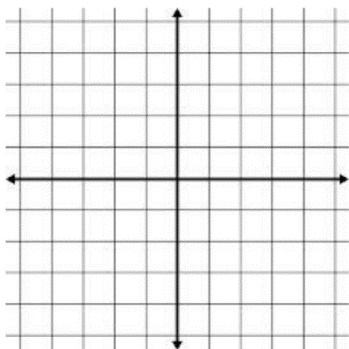
$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$   $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

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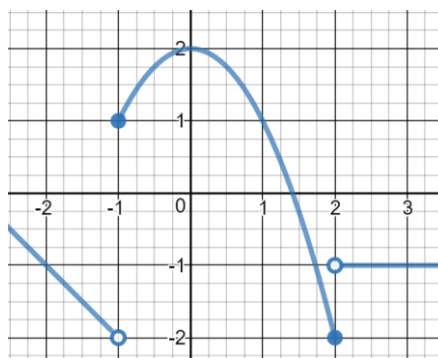
$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$   $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

12. Graph the piecewise function

$$f(x) = \begin{cases} 2x+1 & x < -2 \\ |x|-1 & -2 \leq x < 1 \\ \sqrt{x} & x \geq 1 \end{cases}$$



13. Write the equation of the piecewise function



14. Evaluate the following piecewise function for  $h(x) = \begin{cases} -3, & x < 0 \\ 2x, & 0 \leq x < 4 \\ 2x-10, & x \geq 4 \end{cases}$

A.  $h(-1)$

B.  $h(0)$

C.  $h(2)$

D.  $h(4)$

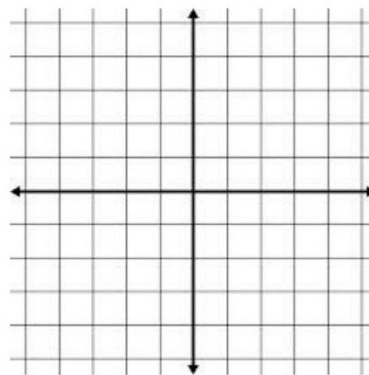
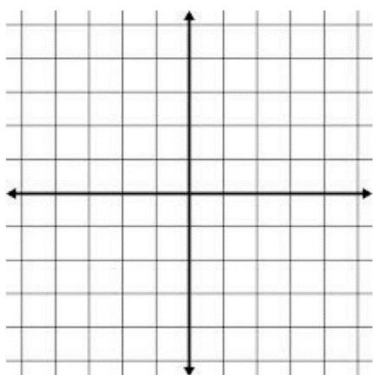
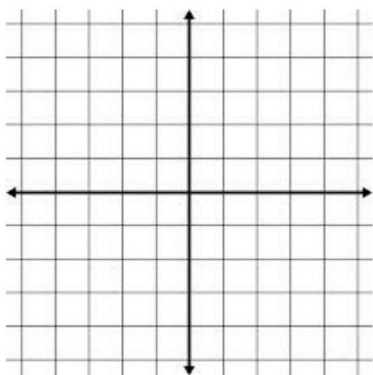
E.  $h(6)$

Find the zeros of the polynomial and sketch a graph

15.  $f(x) = x^5 - x^3$

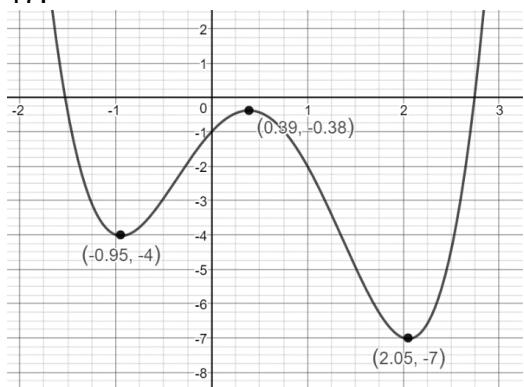
16.  $f(x) = -x(x-2)^2(x+3)$

17.  $f(x) = -(x-1)^2(x+5)^3$



Find the all local (relative) extrema and label as a min or max. Find the intervals where the graph is increasing or decreasing.

17.



## Unit 2 Rational Functions and Inequalities

Solve the inequality. Write your answer in interval notation

1.  $-x^4 + 5x^2 - 4 < 0$

2.  $x^3 - 6x^2 + 9x \leq 0$

3.  $\frac{x-3}{x^2+9x+14} \geq 0$

4.  $\frac{x-1}{x+3} \geq 2$

For each function, find the intercepts, asymptotes, any removable discontinuities and domain

5.  $\frac{1}{x^2-2x-15}$

6.  $\frac{x^2-4}{x^2+7x+10}$

7.  $\frac{x^2+6x+8}{x-2}$

8.  $\frac{x^3-3x^2}{x^2-9}$

9.  $\frac{x+6}{x^2+7x+6}$

10. List all of the x-values where  $f(x) = \frac{x+6}{x^2+7x+6}$  is discontinuous.

11. Verify if the following sets of functions are inverses.

A.  $g(x) = 4 - \frac{3}{2}x$   
 $f(x) = \frac{1}{2}x + \frac{3}{2}$

B.  $f(n) = \frac{-16+n}{4}$   
 $g(n) = 4n + 16$

C.  $h(x) = \sqrt[3]{x} - 3$   
 $k(x) = (x+3)^3$

12. If  $g(x) = 2x - 1$  and  $f(x) = 3x + 4$ , find  $g(f(x))$ .

13. If  $g(n) = 4n - 1$  and  $h(n) = n^2 - 3n$ , find  $g(h(-3)) - h(g(2))$ .

## Unit 3 Log and Exponential Functions

Rewrite as a log or exponential function (you don't need to solve)

1.  $2^x = 5$

2.  $e^x = 7$

3.  $\log 3 = x$

4.  $\ln x = 4$

Use the laws of logs to condense

5.  $\log A - \frac{1}{2} \log B + 3 \log C$

6.  $\ln 5 - 2 \ln 3 - \frac{1}{2} \ln 16$

Use the laws of log to expand

7.  $\log \frac{(a+b)}{c^3 \sqrt{d}}$

8.  $\ln \sqrt{\frac{x}{y(z-1)^3}}$

9. True or False:  $\log(x+y) = \log x + \log y$

10. Draw the exponential and logarithmic parent functions

Find the domain of the function

11.  $\log(-3x+2)$

12.  $\ln(4x-2)$

Solve for x

13.  $\left(\frac{8}{27}\right)^{-\frac{2}{3}}$

14.  $2^{x+2} = \left(\frac{1}{8}\right)^{2x+7}$

15.  $\log_9 x = \frac{1}{2}$

16.  $\log_x 81 = -2$

17.  $\log_x 3 = -\frac{1}{3}$

18.  $\log_{400} 1$

19.  $\log 1,000$

20.  $\ln e^4$

21.  $\log_{16} 32$

22.  $\log(x^2 + 3x) = 1$

23.  $\log_5 2x = 2 \log_5 4 - \log_5 (x-2)$

24.  $\log_3 x + \log_3 (x-8) = 2$

25.  $\ln x + \ln 5 = \ln(x+2)$