

Cumulative Algebra Test 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 test will have 2 parts: calculator and non-calculator. The non-calculator part will be over units 1 and 3 and the calculator part will be over unit 2. You will also be given the formulas for sequences and series.

Unit 1 Polynomials- Non calculator

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 Sequences and Series- Calculator & Formula chart

Recursive sequences and sigma notation
Arithmetic sequences and series (find nth term & total # of terms)
Geometric sequences and series (find nth term & total # of terms)
Converging or diverging infinite geometric series
Binomial expansion

Unit 3 Inequalities and Rational Functions- Non-calculator

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 1 Polynomials- Non calculator

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

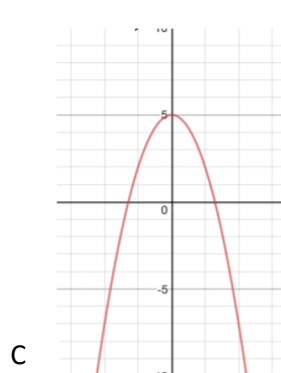
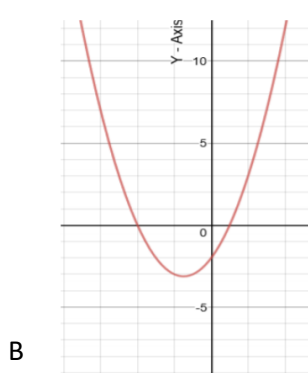
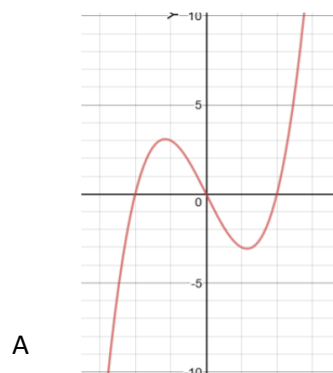
Find the quotient and remainder using synthetic division or long division

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.

8.



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

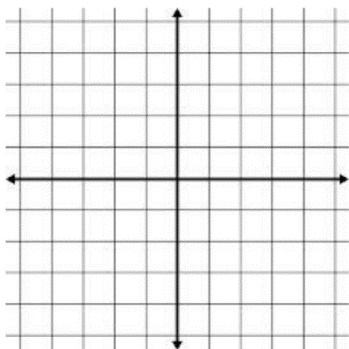
$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$ $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

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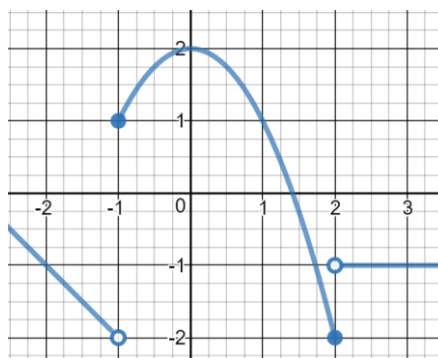
$\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$ $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

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. $h(4)$

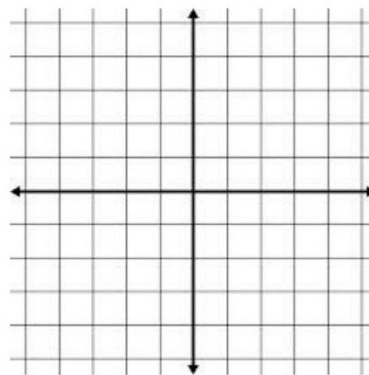
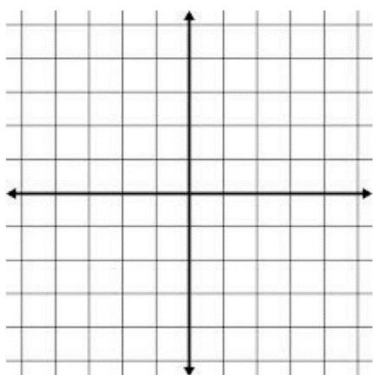
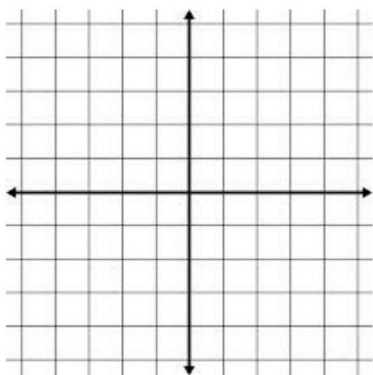
E. $h(6)$

Find the zeros of the polynomial and sketch a graph

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

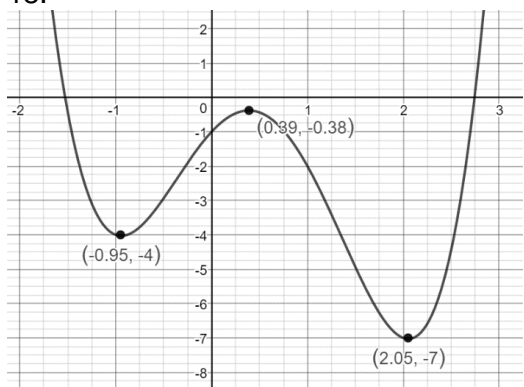
16. $f(x) = -x(x-2)^2(x+3)$

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.

18.



Unit 2 Sequences and Series- Calculator & Formulas Provided

1. State whether the following infinite geometric series diverge or converge.(Not multiple choice!)

a. $2, -4, 8, -16, \dots$

b. $3, 1, \frac{1}{3}, \frac{1}{9}, \dots$

c. $-1, -5, -25, -125, \dots$

2. Decide whether the following sequences are arithmetic, geometric or neither.(Not multiple choice!)

a. $4, 9, 14, 19, \dots$

b. $125, 25, 5, 1, \dots$

c. $-1, 2, -4, 8, \dots$

d. $3, 4, 6, 9, \dots$

3. Find a formula for the following sequence.

$$-0.5, -0.25, 0, 0.25, 0.5, \dots$$

A. $0.75n - 1.25$

B. $-0.25n - 0.25$

C. $0.25n - 0.75$

D. $-0.5n + 0.25$

4. Expand the following binomial $(x - y)^4$

5. Find the sum $\sum_{n=1}^5 (3n - 1)$

6. Find the sum $\sum_{n=3}^7 n^2$

7. A finite series is shown below.

$$-1 + 2 - 4 + 8 - 16 \dots 2048$$

Which sigma notation can be used to represent the series?

A. $\sum_{n=1}^{12} (-1)(-2)^n$

B. $\sum_{n=1}^{12} (-1)(-2)^{n-1}$

C. $\sum_{n=1}^{12} (-1)(2)^{n-1}$

D. $\sum_{n=1}^{12} (-1)(2)^n$

8. A finite series is shown below.

$$49 + 54 + 59 + \dots + 114$$

Which sigma notation can be used to represent the series?

A. $\sum_{n=1}^{14} (49 + 5n)$

B. $\sum_{n=1}^{13} (44 + 5n)$

C. $\sum_{n=1}^{14} (44 + 5n)$

D. $\sum_{n=1}^{44} (49 + 5n)$

9. Find n th term and the 10th term of the geometric sequence.

$$4, 12, 36, 108, \dots$$

10. Find the sum.

$$-30 - 29.7 - 29.4 - \dots - 0.3$$

Unit 3 Rational Functions and Inequalities- Non calculator

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 $g(h(-3)) - h(g(2))$.