Math Exam Quick Sheet

Unit 1 | Algebraic Operations

Topics Covered

- Function notation & composite functions
- Factoring
- Dividing polynomials
- Remainder theorem & factor property

Notes

Factoring

- Can do so by **grouping** or by:
- Always look for a common factor first
- 2 numbers that ADD to give you middle term and MULTIPLY to give you the last term * the first term
- Don't forget to look to factor further even after you finished the first round of factoring

Special Trinomials

- Difference of squares
    -
- Perfect square trinomial
    -
- Forcing the square
    -

Cubes

- Sum
    -
- Difference
    -

Polynomial Division

- If a power is missing in the dividend, it must be included using a 0 as coefficient
- Both expressions must be in the same order (ascending)
- Useful: if one factor of polynomial is known, can divide to find the other factor

Remainder Theorem

- When a polynomial f(x) is divided by x-a, the remainder is f(a)

Factor Theorem

- Same as remainder theorem: if x=a is substituted into polynomial and resulting value is 0, x-a is a factor of the polynomial

Factor Property

- If a polynomial has any factor in the form x-a, then the number a is a factor of the constant term of the polynomial

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Unit 2 | Equations & Inequalities

Topics Covered

- Solving linear equations
- Finding the roots of equations
- State restrictions OR no solution because of contradiction (don't forget to do it for fractions)
- Solving quadratic equations by factoring using the Zero Product Property
- Quadratic formula
  -
- Solving polynomial equations by factoring
- Solving equation involving absolute value

Notes

- ***i* squared is -1**

Zero Product Property

- Set the factors equal to 0 because that means 1 or both of the factors is equal to 0

Discriminant

- The expression b^2-4ac tells us the nature of the roots
  - Two DIFFERENT:
    -
  - Two EQUAL:
    -
  - NO REAL roots (2 conjugate complex roots:
    -

Conjugates

- A complex number is one like a+b*i*
  - Conjugate of a+b*i* is a-b*i*

Solving Polynomial Equation by Factoring

- Look for grouping first – if it doesn't work, do long division method

Absolute Value Equations

- Remember restrictions & different cases

Radical Equations

- Isolate the radical on one side
- Square both sides
- Solve
- Check the roots to identify extraneous roots

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Unit 3 | Polynomial Equations and Inequalities

Topics Covered

- Polynomial inequalities and constructing “sign” charts
-

Notes

Equation of a polynomial-to-be-graphed

$$Y = a (x - 1)^2 (x + 2) (x + 3)^2$$

Remember

- Include “and equal to” in final answer if question has an “and equal to”
- Functions with same roots AND same order are from same “family of functions”
- Don’t forget restrictions on RATIONAL inequalities
- As soon as you see “no solution”, double check to make sure there really IS no solution
    - Example: if you have a “less than or equal to 0” and there is no solution less than, remember the equal to solution too!
    - BASICALLY, beware of “and equals” and double-check the “equal to” solution as a possiblitiy
- When finding y-intercept do not forget to square and multiply by coefficients as well!
- If there’s no constant, y-intercept is 0
- Always pay attention to your solution to see if it can be combined

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Unit 4 | Conics (ellipse and hyperbola only)

Topics Covered

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Notes

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Unit 5 | Trigonometry

Topics Covered

- Similar triangles
    - Angle-Angle
    - Side-Side-Side
    - Side-Angle-Side
- Primary trig rations in a right triangle
- Solving a right triangle
- Trig ratios of special angles (30, 45, 60)
- Reciprocal trig ratios
- Trig ratios for obtuse angles
- Cosine law
- Sine law
- Ambiguous case

Notes

Remember

- Don't forget approximately signs
- Angle of a sun's ray is the same
- Angle of elevation vs. angle of depression
- Trig ratios conversion
    - 1 / sin → csc
    - 1 / cos → sec
    - 1 / tan → cot
- Remember to draw the curve on an angle
- Rationalize denominator!
- X can be negative!
- Ambivalent case → sin or word problem

Cosine Law

- Used to solve a triangle when given <u>two sides</u> and the <u>contained angle</u> OR the <u>measures of 3 sides</u>

Sine Law

- Used to solve any triangle when given <u>two angles</u> and <u>any side</u> OR <u>two sides</u> and <u>an angle opposite to any of the two sides</u>

Obtuse angles

- Angle in Standard Position is one whose vertex lies at origin and initial arm lies on positive x-axis
- Primary trig ratios sin = y/r, cos = x/r, tan = y/x

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Trig Identities

- Sin (180 – 0) = sin 0
- Cos (180 – 0) = - cos 0
- Tan (180 – 0) = - tan 0

Ambiguous Case

- When 2 sides and the non-contained angle of a triangle are given, it may not be unique. May have no triangle, one triangle, or two triangles with the given measurements

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Unit 6 | Trigonometric Functions

Topics Covered

- Converting radians to degrees and vice versa
- Areas of sectors and lengths of arcs
- CAST rule & solving for theta
- Using the trigonometric ratios of angles (x, y, and r)
- Trigonometric identities
- Solving trig equations using identities

Notes

180 =

Remember

- Change your calculator between radians and degrees!
- Watch units (write them in)
- Round to what is said
-

Areas

Radians

Degrees

Trigonometric Identities

Graphing Trigonometric Functions

Cycle – one complete pattern

Period – horizontal length of one cycle

Amplitude – half the difference between maximum value of function and minimum value

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Vertical Stretch (tells you amplitude → |a|)

Horizontal Stretch (tells you period → 360/k)

Vertical Translation

Horizontal Translation

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Unit 7 | Exponents & Logarithms

Topics Covered

- Exponents review
- Applications (exponential growth/decay)
  - $Y = ab^x$
- Logarithms and log laws
- Logarithms with bases other than 10

Notes

Logarithm Laws

Multiplication and Division

Laws of Logs for Powers and Roots

Also remember:

Graphing Logarithmic Functions

Translations

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Unit 8 | Introduction to Matrices

Topics Covered

- Finding a location in a matrix
- Adding matrices
- Multiplying matrices
- Application of matrixes
- Using matrixes to solve linear systems
- Echelon form

Notes

Dimensions: What they mean

3 x 4 4 x 5

Matrix Rules

- Rows can be interchanged
- Rows can be multiplied or divided by any Real number
- Rows can be added and subtracted from one another

Solutions

- CONSISTENT (one unique solution)
- INCONSISTENT (no solution)
- DEPENDENT or COINCIDENTAL (infinite solutions)

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Unit 9 | Statistics

Topics Covered

- Frequency polygon (relative, cumulative, regular)
- Histogram vs bar graph
- Range
- Mean, median, mode
- Weighted mean
- Deviation
- Percentiles

Notes

Standard Deviation Formula

Population

Sample

Percentiles

- Score at which a certain percentage of the data lies below