Pre-Read Notes

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Contents

1 Chapter 1: Function Characts. and Props.

1.1 Functions

- A relationship is a function if a all values on the domain have less than or equal to 1 value on the range
- circular motion is represented by sinosoidal functions
- functions can be represented in many ways

1.2 Absolute value

- $f(x) = |x|$ describes values ≥ 0

1.3 Properties

- Each function has a unique mixture of elements, usually most visually apparent on a graph
- This can be used to distinguish them

1.4 Sketching Graphs

- Do transformations in steps
- Do translations last when listing transformations
- general formula: $y = af(k(x - d)) + c$

1.5 Inverse

- Inverse is done by swapping x and y variables
- graphically a reflection about x and y axis (along $y = x$)
- denoted by $f^{-1}(x)$
- not all inverses are functions

1.6 Piecewise

- A function with multiple rules
- Related to specific intervals in the domain
- filled circle for inclusive, empty circle for exclusive
- Does not have to be continuous

1.7 Operations within

- If functions have overlapping domains they can be combined
- By combining the dependant variable in some way
- Properties carry onwards

2 Chapter 3: Polynomial Functions

2.1 Polynomial Functions

- A polynomial arranged in this formula
- $a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0$
- where n are whole numbers and a are real numbers
- most simplified form
- the "degree" is the highest exponent in the polynomial
- degree is proportional to the number of "lines/curves" in the graph

2.2 Properties

- P. function's degree can indicate a lot:
- shape, turning points, zeroes, and end behavior
- odd degree → opposite end dir., even degree → same end dir.
- if even
- if leading coefficient is pos → goes positive to negative
- if leading coefficient is neg → goes negative to positive

- if odd
- neg $\rightarrow$ face negative, pos $\rightarrow$ face positive
- turning points proportional to n - 1
- y axis symmetrical $\rightarrow$ even function, rotational symetry $\rightarrow$ odd function

2.3 Factored Form

- Polynomial function family $\rightarrow$ P. functions of similar properties
- zeroes of a P. function are same as roots of related P equation (when factored?)
- Factored form gives roots, factored form at 0 gives zeroes
- Use zeroes and a point to get equation from $f(x) = a(x - b)(x - b) \cdots$ where a is solved using the extra point and b, c, $\cdots$ are zeroes
- if root is exponent 1 $\rightarrow$ passes through as if linear
- if root is exponent 2 $\rightarrow$ glances off like quad vertex
- if root is exponent 3 $\rightarrow$ passes flat before going through, like parent root function

2.4 Transformations

- Like any other function

2.5 Dividing

- Polynomials can be divided in similar manner to numbers
- Like with long division
- remainders are added to the end of the equation, rest becomes factors

2.6 Factoring

- Remainder theorum: $\frac{f(x)}{x-1} = f(a)$
- Factor theorum: x - a is a factor if $f(a) = 0$
- To factor:
  1. use factor theorum to determine factor
  2. divide by factor

2.7 Factoring Sum or Difference

- Expressions with two perfect cubes
- $A^3 + B^3 = (A + B)(A^2 - AB + B^2)$
- $A^3 - B^3 = (A - B)(A^2 + AB + B^2)$

3 Chapter 4: Polynomial Equ. and Ineq.

3.1 Solving

- Solutios of f(x) = 0 are zeroes
- sometimes you need to ignore the values outside of the defined intervals

3.2 Solving Linear Inequalities

- Solve linear inequalities by rearranging, like solving linear equations
- If you multiply or divide by a negative number, flip over the inequality sign

3.3 Solving Polynomial Inequalities

- To solve:
  1. Solve for main points, like roots
  2. Plot on some sort of line system
  3. This will give you your solution ranges

3.4 Rates of Change in Polynomials

- Rate of change is $\frac{change\ in\ range}{change\ in\ domain}$
- On interval $x_1 \leq x \leq x_2$ is $\frac{f(x_2)-f(x_1)}{x_2-x_1}$
- When x is very small, $roc = \frac{f(x+h)-f(x)}{h}$
- On any "indexes" the roc is near 0

4 Chapter 5: Exponential funcs., eqs., ineqs.

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4.6

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5 Chapter 6

6 Chapter 7

7 Chapter 8

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9 Chapter 2