College Algebra and the Order of Creation

Executive Summary

The study of College Algebra at Houston Christian University begins within a Christian framework, presenting algebra as a means of discovering the order, structure, and coherence embedded within God's creation. This course builds upon the recognition that mathematical truth represents a complete and consistent order grounded in God's nature. Even though human understanding is limited, students are invited to pursue clarity, precision, and truth in mathematics as an act of stewardship.

Course Description: This course explores the order within God's creation through the study of algebra. Topics include evaluating and manipulating algebraic expressions, the laws of exponents, polynomials, factoring, rational expressions, radicals, the quadratic formula, solving equations and inequalities, systems of linear equations, an introduction to graphing, and applications.

Course Outcomes

1. Perform arithmetic operations on complex numbers and write the answer in standard form;
2. Solve linear, quadratic, higher-order polynomial, radical, absolute-value, exponential, and logarithmic equations of a single variable;
3. Solve linear inequalities and express the solution sets in interval notation;
4. Distinguish functions from more general relations and correctly use function notation;
5. Identify the domain, range, zeros, y-intercepts, max/min, asymptotes, and end behavior of various functions;
6. Sketch the graphs of various functions using their key characteristics;
7. Combine functions using arithmetic and function composition;
8. Transform functions (i.e., perform shifts and reflections in both the x- and y-directions) graphically and algebraically;
9. Use composition to show two functions are inverses;
10. Identify intervals on which a function has an inverse and find the inverse;
11. Write linear functions in slope-intercept and point-slope form given information about points on the graph, slope, or parallel or perpendicular lines;
12. Divide polynomial functions using long division and synthetic division;

13. Find the zeros of a polynomial and their multiplicities using the Rational Zeros Test, factoring, and division;
14. Rewrite logarithmic equations as exponential equations and vice versa;
15. Use the properties of logarithms to expand or contract logarithmic expressions;
16. Solve systems of two equations in two variables using substitution and elimination;
17. Analyze algebraic patterns and structures as a demonstration of the order, logical coherence, consistency, and creativity within God's creation.

Course Distinctives

1. **Pursuit of Truth with Humility**: Students are encouraged to approach mathematics with humility and confidence – recognizing that mathematical truths are objective and knowable, human understanding remains incomplete. This framework allows students to reason carefully, be intellectually honest with their progress, and acknowledge that all truth ultimately finds its source in God.

2. **Community Learning**: Students are called to support, challenge, and encourage one another in the learning process, recognizing that understanding is often deepened through collaboration. This course emphasizes the importance of learning within a community.

3. **Appreciation of the Beauty of Mathematics**: This course invites students to recognize and appreciate the beauty and symmetry of mathematics. Algebra reveals patterns and structures that point to an orderly and beautiful creation. Student's are encouraged to see mathematical work not merely as problem-solving, but as an encounter with the aesthetic richness of God's creation.