MTH 225 Learning Targets

(Core): 1, 3, 6, 8, 11, 12, 15, 18, 20

1. **(Core)** I can represent an integer in base 2, 8, 10, and 16 and represent a negative integer in base 2 uing two's complement notation.
2. I can perform addition, subtraction, multiplication, and division in binary.

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3. **(Core)** I can identify the parts of a conditional statement and write the negation, converse, and contrapositive of a conditional statement.
4. I can construct truth tables for propositions involving two or three variables and use truth tables to determine if two propositions are logically equivalent.
5. I can identify the truth value of a predicate, determine whether a quantified predicate is true or false, and state the negation of a quantified statement.

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6. **(Core)** I can represent a set in roster notation and set-builder notation; determine if an object is an element of a set; and determine set relationships (equality, subset).
7. I can perform operations on sets (intersection, union, complement, Cartesian product), determine the cardinality of a set, and write the power set of a finite set.
8. **(Core)** I can determine whether or not a given relation is a function; determine the domain, range, and codomain of a function; and find the image and preimage of a point using a function.
9. I can determine whether a function is injective, surjective, or bijective.
10. I can evaluate special computer science functions: floor, ceiling, factorial, `DIV`, and `MOD` (`%`).

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11. **(Core)** I can use the additive and multiplicative principles and the Principle of Inclusion and Exclusion to formulate and solve counting problems.
12. **(Core)** I can calculate a binomial coefficient and correctly apply the binomial coefficient to formulate and solve counting problems.
13. I can count the number of permutations of a group of objects and the number of k-permutations from a set of n objects.
14. I can use the "stars and bars" method to count the number of ways to distribute objects among a group.

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15. **(Core)** I can generate several values in a sequence defined using a closed-form expression or using recursion.
16. I can use sigma notation to rewrite a sum and determine the sum of an expression given in sigma notation.
17. I can find closed-form and recursive expressions for arithmetic and geometric sequences.
18. **(Core)** I can determine a recurrence relation for a given recursive sequence and check whether a proposed solution to a recurrence relation is valid.
19. I can solve a second-order linear homogeneous recurrence relation using the characteristic root method.

20. **(Core)** Given a statement to be proven by mathematical induction, I can state and prove the base case, state the inductive hypothesis, and outline the proof.