**Exam II**

Ramsey Numbers Final Exam

# Problem 1:

State the asymptotic relationship between the functions and , as in , where may be , , . You must justify your answer by showing your work using the

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|  | *formula* |
|  | *substitute values* |
|  | *remove smaller order terms* |
|  | *cancel like terms* |
|  | *solve* |

Since , the statement is true.

Since , the statement is true.

Since , the statement is true.

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|  | *formula* |
|  | *substitute values* |
|  | *cancel like terms* |
|  | *limit rule* |
|  | *limit rule* |
|  | *limit rule* |
|  | *limit rule* |
|  | *solve* |

Since , the statement is true.

Since , the statement is false.

Since , the statement is false.

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|  | *formula* |
|  | *substitute values* |
|  | *base conversion* |
|  | *log rule* |
|  | *cancel like terms* |
|  | *limit rule* |

Since , the statement is true.

Since , the statement is true.

Since , the statement is true.

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|  | *formula* |
|  | *substitute values* |
|  | *factor* |
|  | *cancel like terms* |
|  | *exponent rule* |
|  | *exponent rule* |
|  | *subtraction* |
|  | *limit rule* |
|  | *limit rule* |
|  | *limit rule* |

Since , the statement is false.

Since , the statement is true.

Since , the statement is false.

# Problem 2:

Using the master theorem for solving recurrences, state the Big-O value for the following recurrences. If it is inappropriate to use the master method, then state this fact instead.

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| for some constant |  |
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| for some constant  for some constant  and all sufficiently large |  |

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| Case 3 |
| is polynomially greater than |
| : The work completed in the sub-roots, which are not leaves, of the recursion tree is the primary determinant of the computational complexity. As is polynomially greater than , our regularity condition is met. |

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| Case 2 |
| and are polynomially equivalent |
| : The work is evenly distributed between the leaves and sub-roots of the recursion tree. |

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| No Master Theorem Case Applicable |
| We can not compare theandasis *undefined*. As such, the master theorem can not be applied here. |

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| Case 3 |
| is polynomially greater than |
| : The work completed in the sub-roots, which are not leaves, of the recursion tree is the primary determinant of the computational complexity. As is polynomially greater than , our regularity condition is met. |

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| Case 1 |
| is polynomially greater than |
| : The work completed in the sub-roots, which are not leaves, of the recursion tree is the primary determinant of the computational complexity. As is polynomially greater than , our regularity condition is met. |