

# Study Guide for Test #1

## Mathematics 140---Applied Calculus

Dr. Peratt

**How to Read this Chart:** In this chart, I divide the material into various sub-topics. On the right, you can see the specific problems that deal with that topic.

- Topics highlighted in **red** will be on the test, because they are foundational topics. If the test is too long and I need to remove problems from them, I will not be removing problems from the red sections.
- Topics in **blue** are ones that I consider as a “set.” I will choose at least one problem from each set of blue, but not necessarily a problem from each bullet point within that set.
- Any items in black have a low probability of appearing on the test, and I will use them only if the test is short enough to allow sufficient time for working them.

| Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Homework Related to Given Topic                                                                                                                                                                                                                                                                     |
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| <b>1. Terminology:</b> <ul style="list-style-type: none"> <li>• Explain the difference between a growing function and an increasing function or between a decaying function and a decreasing function, using examples if necessary.</li> <li>• Be able to provide definitions of the following terms, and examples where appropriate: <ul style="list-style-type: none"> <li>• Mathematical Model</li> <li>• Descriptive Model</li> <li>• Predictive Model</li> <li>• First Principles</li> <li>• Theoretical Model</li> <li>• Statistical Model</li> <li>• Proportional</li> <li>• Jointly Proportional</li> <li>• Inversely Proportional</li> <li>• Actual Infinity</li> <li>• Potential Infinity</li> </ul> </li> </ul> | <p>From the Lecture Notes and Readings.</p>                                                                                                                                                                                                                                                         |
| <b>2. Modeling:</b> <ul style="list-style-type: none"> <li>• Writing the form of a model and identify factors that can and cannot affect the value of the proportionality constants.</li> <li>• Given data, determine whether a given model is consistent with the data and, if so, the value of the proportionality constant.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>• <u>Homework on Modeling</u>: 1, 6.</li> <li>• <u>Homework on Modeling</u>: 2, 3, 4, 5.</li> </ul>                                                                                                                                                          |
| <b>3. Linear Functions</b> <ul style="list-style-type: none"> <li>• Understand the meaning of the slope and vertical intercept of a linear function in a real-world scenario.</li> <li>• Understand the graphical meaning of slope and intercept.</li> <li>• Find a linear equation given information in some form.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• <u>Linear Functions, Part #1</u>: 11, 12, 14.</li> <li>• <u>Linear Functions, Part #1</u>: 9, 10.<br/><u>Linear Functions, Part #2</u>: 2-5.</li> <li>• <u>Linear Functions, Part #1</u>: 1, 3, 23.<br/><u>Linear Functions, Part #2</u>: 1a-g.</li> </ul> |

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| <p><b>4. Rate of Change:</b> Answer questions about the meaning of rate of change.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p><u><a href="#">Homework on Rate of Change: 1-6.</a></u></p>                                                                                                                                                                                                                                                                                                                                                             |
| <p><b>5. Power Functions:</b></p> <ul style="list-style-type: none"> <li>Given a function, recognize whether it is a power function and, if so, put it in the form <math>y = ax^p</math>.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li><u><a href="#">Homework on Power Functions: 1-9.</a></u></li> </ul>                                                                                                                                                                                                                                                                                                                 |
| <p><b>6. Interpret Parameters on Graphs of Exponential Functions:</b></p> <ul style="list-style-type: none"> <li>Write an exponential or linear function given a verbal description, or write a verbal description given an exponential or linear function.</li> <li>Match descriptions or graphs of exponential functions with their corresponding formulas.</li> <li>Given an exponential function: (1) determine whether it is growing or decaying, (2) give a reason for your answer, (3) state the initial value of the function, (4) give the (non-continuous) rate of growth/decay, (5) give the continuous rate of growth/decay (if function uses <math>e</math>), (6) sketch a graph of the function.</li> <li>Find the equation of an exponential function given two points.</li> <li>Use logarithms to solve exponential equations.</li> </ul> | <ul style="list-style-type: none"> <li><u><a href="#">Homework on Exponential Functions: 8.</a></u></li> <li><u><a href="#">Homework on Exponential Functions: 2, 3, 4, 5.</a></u></li> <li><u><a href="#">Homework on Exponential Functions: 1a-1f.</a></u></li> <li><u><a href="#">Homework on Exponential Functions: 6, 7.</a></u></li> <li><u><a href="#">Homework on Exponential Functions: 9, 10.</a></u></li> </ul> |