Math 160 Review Sheet for the Final Exam

Date & Time of Final Exam *(You must take the final exam with your own section.)*:

Tuesday, May 8 at 9:00 am (*11:00 am section*)

Saturday, May 5 at 7:00 pm (*1:30 pm section*)

Book Sections: 1.1-1.3, 1.5-1.8, 2.1-2.6, 2.8, 3.1-3.5, 3.7, 3.9, 4.1-4.5, 6.1-6.4, Appxs. D, E.

The specific topics are as follows:

1. Domain of a function, vertical line test, linear functions, graphing transformations, composition of functions, piecewise defined functions, trigonometry examples using "useful triangles". (1.1, 1.2, 1.3, App. D)
2. Different types of limits, including one-sided limits, infinite limits, and limits at infinity. Calculating limits using Limit Laws. Squeeze Theorem. (1.5, 1.6, 3.4)
3. Continuity and types of discontinuities. Intermediate Value Theorem. (1.8)
4. Computing f' using the definition of derivative. Tangent lines, velocity, and instantaneous rates of change. (2.1, 2.2)
5. Graphing f' using the graph of f. Points of non-differentiability. (2.2)
6. Derivative formulas #1-8. (2.3)
7. Derivatives involving trig functions. (2.4)
8. Derivatives using the Chain Rule. (2.5)
9. Implicit differentiation. (2.6)
10. Related Rates. (2.8)
11. Relative maxima/minima and absolute maxima/minima. (3.1)
12. Mean Value Theorem. (3.2)
13. Graphing using the following five steps: I. Find intercepts. II. Find asymptotes. III. Find relative extrema and intervals where increasing/decreasing. IV. Find inflection points and intervals where concave up/down. V. Connect the important points using concavity and intervals of increase/decrease. (3.3-3.5)
14. Optimization (Applied Max/Min) Problems. (3.7)
15. Indefinite integrals using Integration Rules 1-10 and using substitution. (3.9, 4.4, 4.5)
16. Σ notation and properties of sums. (App.E)

17. Connection between the definite integral $\int_a^b f(x)\,dx$ and area. (4.1, 4.2)

18. Approximating $\int_a^b f(x)\,dx$ by Riemann sums. (4.1, 4.2)

19. Formal definition of $\int_a^b f(x)\,dx$ and computing $\int_a^b f(x)\,dx$ using the definition. (4.2)

20. Fundamental Theorem of Calculus. (4.3)

21. Definite integrals by substitution. (4.5)

22. Net Change Theorem. (4.4)

23. Relationship between $\int_a^x f(t)\,dt$ and $f(x)$. (4.3)

24. Comparison Properties of $\int_a^b f(x)\,dx$. (4.2)

25. Symmetry Properties of $\int_a^b f(x)\,dx$. (4.5)

26. Exponential functions and the definition of e. Derivatives and integrals of functions involving e^x. (6.2)

27. One-to-one functions and their inverse functions. (6.1)

28. Relationships between logarithmic and exponential functions. (6.3)

29. Logarithmic differentiation. Derivative of general exponential functions and general logarithmic functions. Integration rule: $\int \frac{1}{x}\,dx = \ln|x| + C$. (6.4)

30. I will ask you to prove that $e = \lim_{n\to\infty}(1+\frac{1}{n})^n$ using the fact that $\frac{d}{dx}\ln x = \frac{1}{x}$. (6.4)

31. Formal definition of limit. (1.7)