Math 171-01
Final Exam Information

The comprehensive final exam is worth 150 points and is scheduled for Monday, December 10, 10:00am–11:50am, in Room 4270. Special office hours during finals week:

- Monday, December 10: 12:00pm–1:00pm
- Tuesday, December 11: 10:00am–12:00pm
- Thursday, December 13: 11:00am–1:00pm

Extended office hours for the week of December 3:

- Monday, December 3: 11:00am–12:00pm
- Tuesday, December 4: 10:30am–12:30pm
- Wednesday, December 5: 10:00am–12:00pm
- Thursday, December 6: 10:30am–12:30pm

The following skills and concepts may be assessed on the final exam. You are allowed to use the two half-page formula cards that you were given at the beginning of the semester. You are responsible for knowing any other formulas that may be required. (Even though more material was covered in class, you will only be assessed on topics relating to the following skills.)

Skills Checklist

1. Find the equation of a line (especially a tangent line).
2. Compute limits by substitution. For example, $\lim_{x\to 3}(x^2 - 5x + 1)$.
3. Know what to do with limits of the form $\frac{0}{0}$. For example, $\lim_{x\to 1} \frac{x^2-1}{x-1}$
4. Know how to use $\lim_{x\to 0} \frac{\sin x}{x} = 1$. For example, $\lim_{x\to 0} \frac{\sin 5x}{\sin 3x}$.
5. Determine if an infinite limit is $+\infty$, $-\infty$, or DNE.
6. Find limits at infinity.
7. Test for continuity (especially in piecewise defined functions).
8. Compute a derivative from the definition. $f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$
9. Apply standard differentiation rules, including the chain rule for compositions of functions.
10. Know how to derive the differentiation formulas for the trig functions.
11. Solve problems involving position, velocity, and acceleration. Know the difference between average velocity and instantaneous velocity.

12. Compute derivatives of implicitly defined functions.

13. Set up and work out a straight forward related rate problem.

14. Find the absolute extrema of continuous functions on closed and bounded intervals.

15. Apply the first derivative test to determine relative extrema and open intervals on which a function is increasing/decreasing.

16. Apply the second derivative test to find inflection points and open intervals on which a function's graph is concave up/down.

17. Find all asymptotes (vertical, horizontal) of the graph of a function.

18. Set up and work out a straight forward optimization problem.

19. Compute differentials. $dy = f'(x)dx$

20. Use differentials to approximate change. $\Delta y \approx f'(x)\,\Delta x$

21. Use Newton's Method $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ to approximate solutions of $f(x) = 0$.

22. Compute linearizations and use them to approximate functions values.

23. Apply standard antidifferentiation rules to evaluate indefinite integrals. Do not forget to include $+C$ with your antiderivatives.

24. Compute Riemann sums.

25. Understand the relationship between $\int_a^b f(x)dx$ and the area of the region under the graph of f.

26. Know and use the basic properties of definite integrals.

27. Use the Fundamental Theorem of Calculus to compute $\int_a^b f(x)dx$.

28. Use substitution to evaluate definite and indefinite integrals.

29. Find the area between two curves.