

Math 184 - Information for Students about the MATH 184 April Final Examination

I am copying some standard notes concerning final exams given in December. Read this before asking me questions.

1. The MATH 184 final exam will be held from noon to 2:30 p.m. on Friday, April 25, 2014 in Hebb 100.
2. This is a closed-book exam. Students may not bring notes or books to the exam room.
3. Students may NOT have cell phones, or any other electronic devices on or near them during this exam. A cell phone that goes off during the exam will be treated as an attempt by the student to disrupt the exam.
4. No calculators are permitted.
5. Students may NOT have a pencil case on or around them during this exam. Students may have a reasonable number (4) of pens and/or pencils on their exam table. No eraser tape or eraser fluid (e.g. whiteout) may be used on the exam.
6. Students may not wear ball caps or hoodies or other head coverings that obscure the face during the exam. Head coverings worn for religious reasons are acceptable, of course.
7. Students are encouraged to leave their backpacks, purses, and other personal bags at home. The invigilators WILL NOT be responsible for lost and/or stolen items.

The format of the exam is similar to the format for the 2011W MATH 104/184 exam. A link to this latter exam is posted on the departmental website under the Undergraduate tab – > Final exams – > past exams. In particular, Question 1 consists of 14 short problems, which are worth 3 marks each, for a total of 42 marks. There may be some multiple choice problems included in the short answer problems. Questions 2, 3,4,5, and 6 are full-solution problems, which are worth a total of 58 marks. In Question 1, part marks are possible for each problem except any multiple choice problems. A student may receive 1 or 2 marks based on correct partial solutions. Only scores of 0,1,2, or 3 are possible on each part.

The final exam is based on the MATH 104/184 syllabus, as published in the form of the Course Outline on the main MATH 104/184 website. Hence, you should know the topics in this posted syllabus. The final exam DOES NOT have a question involving inverse trigonometric functions. The final exam DOES NOT have a question involving Taylor polynomials or series, except there can be a question concerning linear approximation, including worst-case error analysis and also the quadratic approximation.

- p, q, R, C, P problems. Note that p is a function of q and also q is a function of p . We can choose either interpretation.

-exponent laws and logarithm laws

-limits (various types including limits at infinity for horizontal asymptotes and infinite limits for vertical asymptotes)

-derivatives: $f'(a)$ is rate of change of a function $f(x)$ with respect to x , at $x = a$, tangent line to the curve $y = f(x)$ at the point $(a, f(a))$, and the limit definition of derivatives (which is the main reason we study limits)

-derivative rules to assist us in computing limits e.g. power rule, sum rule, product rule, quotient rule, chain rule, derivatives of main functions e^x , $\ln(x)$, $\sin(x)$, $\cos(x)$

-when one function is given implicitly through an equation we have implicit differentiation; much better than solving equation explicitly for that function

-related rates

-relative derivatives. e.g. elasticity

-maximum (or minimum) of a function

-curve sketching

- optimization (many interesting examples)
- linear approximation and quadratic error term
- quadratic approximation

Common high school formulae may be needed. You need to memorize these formulae.

The area of a triangle of base b and height h is $\frac{1}{2}bh$.

The volume of a rectangular box: $V = xyz$, where x, y , and z are the dimensions of the box.

The volume of a sphere: $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere. The area of the sphere of radius r is $4\pi r^2$.

The area of a circle: $A = \pi r^2$, where r is the radius of the circle. The circumference of a circle: $C = 2\pi r$, where r is the radius of the circle.

The Pythagorean Theorem: $a^2 + b^2 = c^2$, where a and b are the sides of a right triangle, and c is the hypotenuse.

The quadratic formula: The roots of $ax^2 + bx + c = 0$ are given by $x = \frac{b \pm \sqrt{b^2 - 4ac}}{2a}$.

There are other formulae which are a natural part of the this course. You need to know those as well. For example, you should know the product rule. And the derivative of $\sin(x)$. The following formula from the course will be given on the exam if it is necessary: the elasticity of demand $\varepsilon = \frac{p}{q} \frac{dq}{dp}$. This formula will not be explained on the exam, nor may students ask questions about it of the invigilators.

The following comments give some guidance on expectations for the final exam concerning grading.

In a single question, once a student makes an error, the grade consequence of that error for the remaining parts of the problem will depend on whether or not the error trivializes the problem or makes the problem far too complex. For example, if a calculation error in part (a) of a graphing problem means that a place where there is a vertical asymptote is not identified, the student would lose most or all of the marks for any affected parts that question.

Simplification is encouraged except where stated otherwise. For example, $1 + \frac{20}{20}$ should be simplified to 3, though the mark consequences for not simplifying this answer would be minimal. Simplification may be needed when the answer, such as a derivative, is to be used in a subsequent calculation. An example of the need for simplification was question 10 on test 4. Calculator-ready answers, which are formed of numbers and standard functions (e.g. e^x , $\sin(x)$, etc.) need not be simplified. For example, both $\arcsin(1/2)$ and $\pi/6$ are acceptable. Students should endeavour to write the mathematics correctly. Using notation incorrectly, such as $\lim_{x \rightarrow a} = f(a)$ instead of $\lim_{x \rightarrow a} f(x) = f(a)$ is frowned upon, but wont be marked down unless it affects the logical flow. Similarly, improper use of brackets or errant = signs are frowned upon, but wont be marked down unless they affect the logical flow.

The grader should not have to decipher an answer. An answer in which it is unclear if there is a + or - sign, for example, will be deemed one way or the other by the best guess of the grader. An example is a - sign that has been erased, but is still visible; the assumption is a + sign in this case. Erased or crossed out work will not be counted against the student. Multiple solutions where one answer is wrong can be counted as wrong even if one of the answers is correct. Incorrect mathematics included in a solution, even if the overall solution reaches the correct answer, will be marked down. An example would be if a student were to correctly use the first derivative test to show that a critical point is a relative maximum, but include in the space given for the solution an incorrect calculation of the second derivative of the given function as part of another attempt at the solution. Please show your work. I expect some arguments and, typically, correct final answers will not receive full credit if no arguments are given. If you use a logarithm function, other than $\ln(x)$, then indicate the base. No aids allowed e.g. no calculators, no cellphones etc.