

Math 71B – Final Exam Study Guide

Spring 2014, Prof. Beydler

Final Exam

- Date: Tuesday, June 10, 2014 from 4:30pm to 7:00pm
- Will cover material from **both Math 71A and 71B**.
- The test will start at 4:30pm, and you'll have 2 hours and 30 minutes to finish it.
- There will be 2 parts to the final exam:
 - Part 1: No calculators allowed. This part will be short.
 - Part 2: Scientific calculator allowed (you'll need it!).
- When you're finished with Part 1, turn it in and I'll give you Part 2.
- No notes or books during the test.
- Please visit my office hours if you need help. If you don't understand something, don't be embarrassed to stop by—I'm very patient. If you can't make it to my office hours, then feel free to e-mail me with any questions: dbeydler@mtsac.edu

I'll provide you with the following formulas:

- (5.5) $A^3 + B^3 = (A + B)(A^2 - AB + B^2)$
 $A^3 - B^3 = (A - B)(A^2 + AB + B^2)$
- (10.1) Distance between (x_1, y_1) and (x_2, y_2) : $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- (10.1) Midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
- (11.4) Binomial coefficient: $\binom{n}{r} = \frac{n!}{r!(n-r)!}$
- (11.4) Binomial Theorem: $(a + b)^n = \binom{n}{0}a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \dots + \binom{n}{n}b^n$
- (11.4) $(r + 1)^{\text{st}}$ term of binomial expansion of $(a + b)^n$ is $\binom{n}{r}a^{n-r}b^r$

Here is a summary of some of the basic formulas you'll want to know:

- (2.4) Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$, Standard form: $Ax + By = C$, Slope-intercept form: $y = mx + b$
- (2.5) Point-slope form: $y - y_1 = m(x - x_1)$
- (2.4) Horizontal lines: $y = b$, and vertical lines: $x = a$
- (2.5) parallel \leftrightarrow same slope (also two vertical lines are parallel)
- (2.5) perpendicular \leftrightarrow slopes are negative reciprocals (also, vertical and horizontal lines are perpendicular)
- (4.3) $|\square| = c$ means $\square = c$ or $\square = -c$
- (4.3) $|\square| < c$ means $-c < \square < c$, $|\square| > c$ means $\square > c$ or $\square < -c$
- (5.2) $(A + B)^2 = A^2 + 2AB + B^2$, $(A - B)^2 = A^2 - 2AB + B^2$, $(A + B)(A - B) = A^2 - B^2$
- (7.1) If n is even, $\sqrt[n]{a^n} = |a|$ ($= a$ if a nonnegative). If n is odd, $\sqrt[n]{a^n} = a$.
- (7.2) $a^{\frac{1}{n}} = \sqrt[n]{a}$, $a^{\frac{m}{n}} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$, $a^{-\frac{m}{n}} = \frac{1}{a^{\frac{m}{n}}}$

- (7.2) $b^m \cdot b^n = b^{m+n}$ $\frac{b^m}{b^n} = b^{m-n}$ $(b^m)^n = b^{mn}$ $(ab)^n = a^n b^n$ $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
- (7.3, 7.4) Product Rule: $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$, Quotient Rule: $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
- (7.7) $i = \sqrt{-1}$, $i^2 = -1$
- (8.1) Add $\left(\frac{b}{2}\right)^2$ to complete the square, Pythagorean Theorem: $a^2 + b^2 = c^2$
- (8.2) Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, Discriminant: $b^2 - 4ac$
- (8.3) Graphing quadratic functions in form $f(x) = a(x - h)^2 + k$
- (8.3) Finding minimum and maximum values using $x = -\frac{b}{2a}$ (to find vertex of parabola)
- (9.2) Compose functions: $(f \circ g)(x) = f(g(x))$
- (9.3) $\log_b x = y$ can be rewritten $b^y = x$ (and vice versa)
- (9.3) $\log x = \log_{10} x$ and $\ln x = \log_e x$
- (9.4) $\log_b(MN) = \log_b M + \log_b N$
 $\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$
 $\log_b M^p = p \log_b M$
- (10.1) Circle with center (h, k) and radius r : $(x - h)^2 + (y - k)^2 = r^2$
- (10.2) Ellipse with center (h, k) : $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
- (10.3) Hyperbola: $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ or $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$
- (10.4) Horizontal parabola with vertex (h, k) : $x = a(y - k)^2 + h$
- (11.1) $n! = n(n - 1)(n - 2) \dots (3)(2)(1)$
- (11.1) $\sum_{i=1}^n a_i = a_1 + a_2 + a_3 + \dots + a_n$

Extra Credit!

- If you write up the answers to all of the review exercises (see Final Exam Review Exercises on the class website), and hand them in at the test, you can earn up to 3% extra credit towards your test (depending on neatness and completeness)! These review exercises don't cover everything.
- If you go to the MARC/LAC for 4 hours between Test #3 and the Final Exam, you'll get 1% extra credit towards the Final Exam.