1. THE TASKS

(1) Attend a class (Lecture[1] through Lecture[58]), 10 points each
(2) Write a summary of a lecture (Summary[1] through Summary[56])
(3) Write detailed notes of a lecture (Notes[1] through Notes[56])
(4) Attend a seminar (Colloquium[1] through Colloquium[11])
(5) Do a homework problem (Homework[1] through Homework[45])
(6) Do a Project Euler problem (Euler[1] through Euler[420])
(7) Memorize something (Memory[1] through Memory[22])
(8) Learn \LaTeX
(9) Learn Python the Hard Way (Python[1] through Python[52])
(10) Solve a final exam problem (Final[1] through Final[10])
(11) Experience math culture (Culture[1] through Culture[22])

Each task is to be complete

1.1. **Attend a class.** Our class is scheduled to meet on 28 days, and on 2 periods for each of those days. Being there at 10:10 A.M. satisfies a 10 point task, and staying there until 12:05 P.M. satisfies a task. The final exam also occupies two class periods, and showing up counts as two tasks. If you do the arithmetic, just showing up on time and not leaving early gets you more than a 1/3 of the way to an A. These 58 tasks are worth 10 points each; assigned by me and so not subject to normalization.

1.2. **Write a summary of a lecture.** Each day, you may submit a summary of the previous day’s two periods. You must use the template on the website for this, and in particular this task must be completed with \LaTeX. The expectation is that a summary will be about 200 words.

1.3. **Write detailed notes of a lecture.** My lectures are more free wheeling than the textbook, and I encourage you to ask questions aggressively. As such, the lectures are frequently quite different from what you find elsewhere. This task is to \LaTeX your notes (filling in all details). Your first attempt at each of these tasks must be

---

*Date: May 11, 2014.*
submitted within 14 days of when the lecture happened. That is, the notes for the lecture on Monday, January 27, 2014, must be handed to me before class begins on Monday, February 10. Catch the wording here: 14 days. No allowance is made for illnesses or holidays. You must use the template on the website for this.

1.4. **Attend a seminar.** There are extra “lectures” at CSI this semester, given by mathematicians who hope to be employed in the CSI math department. If you attend some of these and submit written summaries, as well as your impression of the candidate, that will count as a task. Stay alert for announcements of these, as they may be scheduled only a few days in advance.

   (1) Jamshidi
   (2) Gilles
   (3) Franklin (3/3)
   (4) Conidis (3/5)
   (5) White (3/10)
   (6) Hou (3/13)
   (7) Milinovich (3/14)
   (8) Wang (3/18)
   (9) Ames (3/20)
   (10) Verzani (3/27)
   (11) Lam (5/8)

1.5. **Do a homework problem.** In class, I will announce particular homework problems. You should do these. If you want credit for the task, you should \texttt{LaTeX} your solution (not just your answer) using the template available on the course website, and submit it to me within 21 days of the lecture, and not after the final exam. Note again that the deadline is in terms of calendar days and is firm independent of holidays, vacations, illnesses and flat tires.

   (1) Section 1.1 # 1
   (2) Section 1.1 # 2
   (3) Section 1.1 # 11
   (4) Section 1.1 # 26
   (5) Section 1.1, write a detailed proof of the Generalized Rolle’s Theorem
   (6) Section 1.2 # 2
   (7) Section 1.2 # 11
   (8) Section 1.2 # 22
   (9) Section 1.2 # 25
   (10) Section 1.2 # 28
   (11) Section 2.1 # 6
   (12) Section 2.2 # 4
1.6. **Do a Project Euler problem.** Project Euler is a collection of mathematical programming exercises available at [www.projecteuler.net](http://www.projecteuler.net). Create an account there and add me as a friend:

   My Friend Key is 70722871527867_55192bb9d06d400bb56641cee1859869

   When you complete a problem, I should see it. You should prepare a sheet of paper with your name, the date, the problem and answer, difficulty rating, and the
python code that you created to solve it. Give me the paper. You are forbidden from sharing your answer or code with anyone, online or off. You are not forbidden from discussing the problems, however.

1.7. **Memorize something.** To claim a memorization project, you must present me with a single sheet of paper (standard size, no frillies) with your name, the task and its written solution, the date when you decided you were ready to perform, and the number of points you think this task is worth. Then, you must recite the memorized items to me.

(1) The powers $2^i$ for $0 \leq i \leq 10$.
(2) The powers $2^i$ for $0 \leq i \leq 20$.
(3) The powers $2^i$ for $0 \leq i \leq 30$.
(4) The squares $n^2$ for $0 \leq n \leq 20$.
(5) The squares $n^2$ for $0 \leq n \leq 50$.
(6) The squares $n^2$ for $0 \leq n \leq 100$.
(7) The prime numbers up to 100.
(8) The prime numbers up to 500.
(9) The factorials $n!$ for $0 \leq n \leq 10$.
(10) The factorials $n!$ for $0 \leq n \leq 20$.
(11) Decimal expansion of $\pi$ (10 digits).
(12) Decimal expansion of $\pi$ (50 digits).
(13) Decimal expansion of $\pi$ (100 digits).
(14) Decimal expansion of $e$ (10 digits).
(15) Decimal expansion of $\sqrt{2}$ (10 digits).
(16) Decimal expansion of $\sqrt{n}$ (to nearest 1000-th, $0 \leq n \leq 10$).
(17) Decimal expansion of $\sqrt{n}$ (to nearest 1000-th, $0 \leq n \leq 50$).
(18) Decimal expansion of $\sqrt{n}$ (to nearest 1000-th, $0 \leq n \leq 100$).
(19) Memorize 6 rows of Pascal’s triangle (will be spot checked, so not in order!).
(20) Memorize 11 rows of Pascal’s triangle (will be spot checked, so not in order!).
(21) Memorize the lower case Greek alphabet (names and symbols).
(22) Memorize the upper case Greek alphabet (names and symbols).

1.8. **Learn \LaTeX.** Here are some straightforward introduction videos: \url{https://www.youtube.com/playlist?list=PLDD406480D35CE390}. There are no individual tasks in this category, but this is a part of every other task. I may create a few tasks in this direction as the class progresses.

1.9. **Learn Python the Hard Way.** On the website \url{http://learnpythonthehardway.org/book/} you will find step-by-step directions for learning the Python programming language. Exercises 1 through 52 are exactly 52 tasks. To get credit for these tasks, you are to create a \LaTeX file for each containing the exercise and your answers and
explanations to each of the questions asked in the exercise. Make your answers, and any additions you make to the text on the LPtHY website, in red. Find a color printer, and bring me the paper.

1.10. **Solve a final exam problem.** The final exam has yet to be scheduled. It is comprehensive, and will be open book (our textbook only) and open note (solutions to tasks only). It will have 10 tasks on it, and also just showing up for it is a task (under “attend a lecture”), and staying until the end is another.

1.11. **Experience Math Culture.**

1. Watch *A Beautiful Mind*, and write a movie review focusing on the portrayal of math and mathematicians.
2. Watch *Proof*, and write a movie review focusing on the portrayal of math and mathematicians.
3. Watch *Pi*, and write a movie review focusing on the portrayal of math and mathematicians.
4. Watch *N is a Number*, and write a movie review focusing on the portrayal of math and mathematicians.
5. Watch *Fermat’s Last Tango*, and write a movie review focusing on the portrayal of math and mathematicians.
6. Watch *Taking the Long View*, and write a movie review focusing on the portrayal of math and mathematicians.
7. Watch *Julia Robinson and Hilbert’s Tenth Problem*, and write a movie review focusing on the portrayal of math and mathematicians.
8. Watch *Hard Problems*, and write a movie review focusing on the portrayal of math and mathematicians.
9. Read *Godel, Escher, Bach*, and be blown away.
15. Solve a 3-by-3 Rubik’s Cube.
16. Pick the lock on the computer cabinet in our classroom.
17. Visit MoMath, keep your proof of admission, and write a (fun) explanation of an exhibit.
18. Watch one of Vi Hart’s videos, and write a (fun) summary.
19. Solve a 4-by-4 Rubik’s Cube.
(21) Read a chapter of E. T. Bell’s “Men of Mathematics”, and write a short bio of the mathematician in that chapter.

(22) Read Surely You’re Joking, Mr Feynman, and write a short book review.

(23) Watch Good Will Hunting, and write a movie review focusing on the portrayal of math and mathematicians.
2. List of Classes

(1) (1/27) Introduction, $PV = nRT$
(2) (1/27) Introduction to LaTeX
(3) (1/29) Calculus Review
(4) (1/29) Taylor Polynomials
(5) (2/3) Rational numbers, Finite vs. countable vs uncountable
(6) (2/3) Floating point arithmetic
(7) (2/5) Cancelled due to Ice Storm
(8) (2/5) Cancelled due to Ice Storm
(9) (2/10) Bisection
(10) (2/10) Fixed Point Iteration
(11) (2/19) Fixed Point Iteration: When does it work
(12) (2/19) Fixed Point Iteration: Rate of convergence
(13) (2/20) Newton’s Method
(14) (2/20) Variations of Newton’s Method
(15) (2/24) Rates of convergence: Examples
(16) (2/24) Rates of convergence: Acceleration
(17) (2/26) Review Problems
(18) (2/26) Aitken and Steffensen
(19) (3/3) Polynomials - What are they?
(20) (3/3) Fundamental Theorem of Algebra
(21) (3/5) Linear Algebra Review
(22) (3/5) Weierstraß Approximation
(23) (3/10) Lagrange Interpolation, Neville
(24) (3/10) Cubic spline
(25) (3/12) Lagrange Interpolation, 3 theorems
(26) (3/12) Discrete Calculus
(27) (3/17) Floating point trivia
(28) (3/17) Sturm’s theorem I
(29) (3/19) Review
(30) (3/19) Least squares
(31) (3/24) Normalization, $z$-scores
(32) (3/24) Linear regression
(33) (3/26) Sturm’s theorem II
(34) (3/26) Complex numbers and trig identities and integrals
(35) (3/31) Fourier Series I
(36) (3/31) Fourier Series II
(37) (4/2)
(38) (4/2)
(39) (4/7)
(40) (4/7)
(41) (4/9)
(42) (4/9)
(43) (4/23) Reading a paper
(44) (4/23) Reading a paper, II
(45) (4/28) Chebyshev Polynomials
(46) (4/28)
(47) (4/30)
(48) (4/30)
(49) (5/5)
(50) (5/5)
(51) (5/12)
(52) (5/12)
(53) (5/14)
(54) (5/14)
(55) (5/21) Final Exam
(56) (5/21) Final Exam