

SubjectMath.com Practice Test #1

A Full Practice Test For the Subject Math Exam
www.SubjectMath.com

2017 Edition

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Preface

Testimonials

By Prof. Karen E Smith (Associate Chair for Graduate Students, Math Department, University of Michigan):

The website SubjectMath.com offers a valuable resource for students planning to apply to graduate programs in mathematics and the mathematical sciences in the United States. The GRE[®] subject examination in mathematics is required by most departments for admission to graduate programs. The study course provided at SubjectMath.com offers clear, concise online lectures on all the topics tested on the exam in a well-organized series of modules. Students can complete just the modules they most need to review, or, given that the fast pace of the exam is often the main difficulty in achieving a high score, students can complete all the modules, where they will learn many useful tricks for getting through the problems *quickly* and accurately. SubjectMath.com also provides a series of practice test booklets that are formatted exactly as the actual test, allowing students to reproduce exam conditions to maximize the effectiveness of their preparation. In short, SubjectMath.com is an excellent way for students to prepare for the GRE[®] test, reduce stress related to exam taking and maximize their chances of success getting admitted to their dream school.

By Prof. Amir Alexander (UCLA):

Every year thousands of aspiring mathematicians from the U.S. and beyond flood American universities with applications for graduate studies. Almost all of them are required to take the GRE[®] subject exam in mathematics, and the results are critical to their success. How well they do on this test could determine whether they will be admitted to the program of their choice, or even accepted at all. Yet despite the high stakes, it is nearly impossible to find study materials for the test: there are no preparation courses, and only a single sample test is provided by the exam's administrators. How is one to study for this test, which could shape one's career for decades to come? Gilad Pagi and the GP group have the answer. Their website at SubjectMath.com offers a systematic study course for the Mathematics subject exam, the only one of its kind. In dozens of clear online lectures, filled with examples and study problems, the course covers all the topics included in the exam - from the calculus to analysis to algebra and beyond. A series of practice test booklets that precisely reproduce the content, format, and conditions of the actual test accompany the course. A student that has passed through this study course will go into the exam room confident and fully-prepared, and immensely improve his or her chances of success. If you are a student planning to take the GRE[®] subject exam in mathematics, take notice: This is one course you cannot afford to miss.

Preface

This book is a full practice test simulating the GRE[®] Subject Exam in Mathematics (Graduate record examinations subject exam by Educational Testing Service - ETS). This book consists of one practice test belonging to a series of tests that are part of our online preparation course (see www.SubjectMath.com). Each test is published individually. It is highly recommended that these tests are completed in correspondence with the course as solutions may reference results and examples further discussed within the course lectures.

If you are applying for a graduate math program in the US, you must excel in this test in order to be accepted. Alas, relevant materials are scarce and you have no one to tutor you throughout the exam. That's where we, the team in GP Group, come in.

This practice test was written as a part of our preparation course, encompassing all aspects of the subject exam. The team at GP Group composed series of tests similar to the actual subject math exam in many aspects:

- ✓ The test consist of 66 multiple choice questions.
- ✓ The content of the question is taken from the official syllabus of the test.
- ✓ The style of the questions is similar to the questions in the official test example, published by ETS
- ✓ The distribution of the topics among the questions corresponds to the distribution as published by ETS and as seen in the published example test.
- ✓ The printing layout, including the space for scratch work, matches the real exam (as published).
- ✓ The test was designed to be taken in the same time frame and conditions as the real exam.
- ✓ However, all the questions are original and are not published anywhere other than with the course official materials.

Up to the date of publication, this series of books are the only practice exams not published by ETS, possessing all the above features. Considering the scarcity of the prep materials for the subject exam, this book will improve your potential score significantly and, together with the online course, provide a well rounded preparation for the test.

How to Use This Book?

Our goal is to simulate the entire experience of the actual test. Every factor of the following will make your test experience a little less stressful and more “familiar”. This alone can raise your potential score. Try to to make an effort to follow the recommendations.

1. Prepare a simulating environment:

- Free up at least 3 hours for taking the practice exam.
- Prepare an empty desk - preferably, a college chair with an armrest.
- Do not wear a watch. Make sure an analogue clock is available.
- Try to start the practice test at the same time your actual test is scheduled.
- Prepare at least 5 sharpened number 2 pencils and an eraser.
- Put away cellphones, water and food. Do not plan on bathroom breaks.

2. Taking the practice exam:

- USE THE BOOK AS IF IT WERE YOUR EXAM BOOKLET. Use the scratch pages, make notes and draw sketches on these actual pages. This book is specifically designed for mimicking the actual test experience.
- Print out the designated answer sheet for this exam. It can be obtained from the ETS website ¹. Mark your answers there and, later, grade your test only by looking at the answer sheet. Marking your answers correctly on the answer sheet is crucial and worth practicing.
- Give yourself exactly 2 hours and 50 minutes, as it will be on the actual exam.
- Grade yourself accurately - one point on any right answer. Minus 0.25 point for every wrong answer. Refer again to the above PDF file from ETS to estimate your 3 digit score (currently on page 67).

3. Additional notes:

- It is important to use no.2 pencils of good quality. I recommend “Dixon Ticonderoga”. Note that the “pre-sharpened” are usually not sharpened enough. These can be found easily on amazon, or any office supplies store.
- Use a thin eraser. Otherwise, you might erase many answers on your answer sheet when attempting to correct one. I recommend “Paper Mate Tuff Stuff Eraser Stick (SN64801)”.

¹currently on: https://www.ets.org/s/gre/pdf/practice_book_math.pdf, page 69

- (Disclaimer: Those recommendations are based on my own personal experience. I do not have any relationship with these companies)

Useful Links

1. Our prep course site includes links to the different course modules, lectures and handouts. It also includes updates on new published exams, valuable lectures, promo codes for discount on our course materials. This can all be found on our course site.

www.SubjectMath.com

www.facebook.com/gpsubjectmath

2. The video lectures are published on Udemy. Look for our different “Subject Math” modules. Make sure to always check out www.SubjectMath.com for special discounts, before purchasing modules via Udemy.

www.udemy.com

3. Official information about the test from ETS.

www.ets.org/gre/subject/about/content/mathematics

4. Comments, corrections and ideas will be appreciated. Contact us at

↪ subjectmath@gpgroupcompany.com

About the Author

GP Group is led by Gilad Pagi. Pagi graduated 1st in class during his B.S in Math and B.S+M.S in Engineering. Pagi has more than 10 years of experience in teaching, including teaching positions in calculus and linear algebra university courses, private and group tutoring. Pagi achieved a top score in the subject math exam (900). He currently serves as a calculus instructor at the University of Michigan, Ann Arbor, where he is pursuing his PhD in Mathematics.

Acknowledgements

Special thanks to Caleb Springer, our exam “Debugger”, and to Alon Ben-Haim for his enlightening comments.

Disclaimer: Although GP Group is dedicated to providing a comprehensive review of the material and quality resources for students preparing to take the GRE subject exam in mathematics, due to the nature of the exam, it may not include all the background content that might appear in the actual exam. The information given here is no replacement to the official information found on ETS site.

Before starting the practice exam, make sure to follow the instructions from the preface of the book.

If you are ready, start the exam.

Good Luck!

PRACTICE TEST

Note:

- $\log(x)$ denotes the logarithm in the natural basis.
- $\mathbb{R}, \mathbb{C}, \mathbb{Q}, \mathbb{Z}, \mathbb{N}$ denote the real numbers, complex numbers, rational numbers, integers and natural (positive) integers respectively.
- Unless specified otherwise, I is the identity matrix.
- When A is a ring, $A[x]$ denotes the polynomials with coefficients in A .
- “Such that” may be abbreviated as “s.t.”.
- $\arctan(x)$ and $\tan^{-1}(x)$ denote the inverse function of $\tan(x)$, and similarly for $\sin(x)$ and $\cos(x)$.

1). For which plane P the following is true: $(1, 1, 1)$ is orthogonal to each line in P and the volume bounded by P and $x \geq 0, y \geq 0, z \geq 0$ is $\frac{4}{3}$?

- (A) $P = \{(x, y, z) \mid x + y + z = 1\}$
- (B) $P = \{(x, y, z) \mid \frac{1}{2}x + \frac{1}{2}y + \frac{1}{2}z = 1\}$
- (C) $P = \{(x, y, z) \mid 2x + 2y + 2z = 1\}$
- (D) $P = \{(x, y, z) \mid 3x + 3y + 3z = 1\}$
- (E) $P = \{(x, y, z) \mid x + y + z = 0\}$

2). For which $a, b \in \mathbb{R}$ is $\frac{1}{a} > \frac{1}{b}$ true?

- (A) $0 < b < a$
- (B) $b < a < 0$
- (C) $b < a$
- (D) $a < b$
- (E) None of the above.

USE FOR SCRATCH WORK