

First Round: February 27, 2016 at Regional Testing Centers Second Round: April 9, 2016 at The University of North Alabama

COMPREHENSIVE EXAM

Construction of this test directed by
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INSTRUCTIONS

This test consists of 50 multiple choice questions. The questions have not been arranged in order of diculty.

Why Major in Mathematics?

What sorts of jobs can I get with a mathematics degree? Examples of occupational opportunities available to math majors:

Market Research Analyst Cryptanalyst Mathematician
Air Tra c Controller Professor Meteorologist
Climate Analyst Pollster Medical Doctor

Estimator Population Ecologist Lawyer
Research Scientist Operations Research Actuary
Computer Programmer Data Mining Statistician

Where can I work? What sorts of companies hire mathematicians? Well just to name a few...

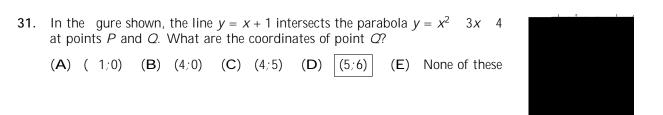
U.S. Government Agencies such as the National Center for Computing Sciences, the National Institute of Standards and Technology (NIST), the National Security Agency (NSA), and the U.S. Department of Energy.

Government labs and research o ces such as Air Force O ce of Scienti c Research, Los Alamos National Laboratory, and Sandia National Laboratory.

Engineering research organizations such as AT&T Laboratories - Research, Exxon Research and

- **12.** Two tangents to the same circle form a 50 angle. The radius of the circle is 10. Find the length of the smaller of the intercepted arcs.

- (B) $\frac{40}{9}$ (C) $\frac{25}{9}$ (D) $\frac{10}{9}$ (E) None of these



- 32. Find the number of distinct solutions to the equation $\sqrt[Q]{5x} = \sqrt[D]{2x}$:
 - (A) 0
- (B) 1
- (C) 2
- **(D)** 3
- (E) None of these
- 33. A box contains four fair coins and six biased coins. Whenever a fair coin is ipped, it lands with heads facing up with a probability of 0.5. Whenever a biased coin is ipped it lands with heads facing up with a probability of 0.9. A coin is randomly chosen from the box and ipped. What is the probability that it will land with heads facing up?
 - (**A**) 0:74
- (B) 0.70
- (C) 0.50
- **(D)** 0.45
- (E) None of these
- 34. The smallest angle of a rhombus is one-half the measure of the larger angle. The shorter diagonal is 20 m. Find the perimeter of the rhombus.
 - (**A**) 40 m
- (B) 60 m
- (C) 80 m
- (**D**) 100 m
- (E) None of these

- **35.** Find the sum of all solutions to the equation e^{2x} $5e^x = 6$.
 - **(A)** 5
- (**B**) In 5
- (C) 6
- (D) In 6
- (E) None of these
- **36.** How many solutions are there to the equation cos(4x) = 2 for x in [0;2]?
 - (**A**) 1
- **(B)** 2
- (C) 4
- (D) 8
- (E) None of these (0)
- 37. Clara is on **A** bike ride. If she bikes uphill 4 miles at a rau998 w 0 0 m 0 16.339 I SQ/F16 9.9626 Tf 77.286 311.191 Td [

41. Quadrilateral *ABCD* is inscribed in a circle with $m \setminus C = 85$. Find $m \setminus A$.

(**A**) 85

(**B**) 95

(C) 105 (D) 115 (E) Not enough information