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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 Engineering, and IBM Research.

Computer information and software rms such as Adobe, Google, Mentor Graphics, Microsoft, and Yahoo Research.

Electronics and computer manufacturers such as Alcatel-Lucent, Hewlett-Packard, Honeywell, Philips Research, and SGI.

Aerospace and transportation equipment manufacturers such as Boeing, Ford, General Motors, and Lockheed Martin.

Transportation service providers such as FedEx Corporation and United Parcel Service (UPS).

Financial service and investment manangement rms such as Citibank, Morgan Stanley, and Prudential.

A Mathematics Major isn't just for those wanting to be Mathematicians!

The top scoring major on the Law School Entrance Exam (LSAT) is Mathematics (Source: Journal of Economic Education)

Mathematics is also a top 5 scoring major on the Medical School Entrance Exam (MCAT) (Source: American Institute of Physics)

Study in the eld of mathematics o ers an education with an emphasis on careful problem solving, precision of thought and expression, and the mathematical skills needed for work in many other areas. Many important problems in government, private industry, and health and environmental elds require mathematical techniques for their solutions. The study of mathematics provides speci c analytical and quantitative tools, as well as general problem-solving skills, for dealing with these problems. The University of North Alabama o ers an undergraduate degree in Mathematics and has many great things to o er, including a new

1. Find the slope of the line between the points $(\sqrt{3}; \sqrt{6})$ and $(2; 4\sqrt{2})$.

   (A) $6\sqrt{6}$ $11\sqrt{2}$ (B) $\frac{5\sqrt{2} + 2\sqrt{6}}{26}$ (C) $5\sqrt{2}$ (D) $\boxed{5\sqrt{2} + 2\sqrt{6}}$ (E) None of these

2. How many values of x satisfy the radical equation $\sqrt{x + 2} + \sqrt{3x + 7} = 1$?

   (A) 0 (B) $\boxed{1}$ (C) 2 (D) In nitely Many (E) None of these

3. In last year's NBA Finals, LeBron James scored a total of 169 points from 2-pointers and 3-pointers. If he made a total of 78 shots, how many 3-pointers did he make?

   (A) 65 (B) 45 (C) 25 (D) 15 (E) $\boxed{\text{None of these (13)}}$

4. Simplify the expression

$$3^5$$

12. Find the distance between the foci of the ellipse given by the equation $\frac{(x \quad 3)^2}{7} + \frac{(y+1)^2}{2} = 1$.

(A) 3 (B) $\boxed{2\sqrt{5}}$ (C) 6 (D) $6\sqrt{5}$ (E) None of these

13.

22.

33. The line perpendicular to $4x + 2y = 5$, and with the same y-intercept, is graphed on the coordinate plane. What is the sum of the non-zero coordinates of its x- and y-intercepts?

(A) $\boxed{2:5}$ (B) 1:25 (C) 3:75 (D) 7:5 (E) None of these

34. Find the inverse function $f^{-1}(x)$ of the function $f(x) = x^2 - 4x + 3$ if $x \geq 2$.

(A) $f^{-1}(x) = \dfrac{1}{x^2 - 4x + 3}$ (B) $f^{-1}(x) = \sqrt{x - 3} + 2$

(C) $\boxed{f^{-1}(x) = \sqrt{x + 1} + 2}$ (D) $f^{-1}(x) = \sqrt{x + 3}$ (E) $f^{-1}(x) = x^2 + 4x - 3$

35.

43. The difference quotient of a function $f(x)$ is the quotient $\dfrac{f(x+h) - f(x)}{h}$, $h \neq 0$. Find the difference quotient of $x^2 + 1$.

(A) 1 (B) h (C) $\dfrac{h^2+1}{h}$ (D) $2x$ (E) $\boxed{2x+h}$

44. Find the value of c so that $x = 1$ is not a vertical asymptote of the graph of the function

$$y = \frac{x^2 - 4x + c}{x^2 + x - 2}.$$

(A) 12 (B) 5 (C) $\boxed{3}$ (D) 4 (E) None of these

45. The function $k(x) = \sqrt{\sin(5x)}$ is the composition of the functions $f(x) = \sin x$, $g(x) = \sqrt{x}$ and $h(x) = 5x$. . .