

# SCHOOL OF ECONOMICS MATHEMATICS AND STATISTICS

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### School of Economics, Mathematics, and Statistics: Frequently Asked Questions

#### 1. What is the School of Economics, Mathematics, and Statistics (SEMS)?

SEMS is an academic division at a university that offers undergraduate and graduate programs in economics, mathematics, and statistics. It combines these disciplines to provide students with a comprehensive understanding of economic theory, mathematical methods, and statistical analysis.

#### 2. What are the benefits of studying at SEMS?

- **Cross-disciplinary education:** Students gain a foundation in both quantitative and qualitative methods, allowing them to tackle complex problems from multiple perspectives.
- **Strong analytical skills:** SEMS programs develop students' logical thinking, problem-solving, and data analysis abilities.
- **Specialized knowledge:** Students specialize in areas such as econometrics, financial mathematics, or data science, preparing them for careers in academia, business, government, and research.

#### 3. What are the career opportunities for graduates of SEMS?

Graduates of SEMS are highly sought after in various sectors:

- **Economics:** Economic analysts, financial planners, market researchers

- **Mathematics:** Actuaries, data scientists, software engineers
- **Statistics:** Statisticians, data analysts, risk managers

#### 4. What are the admission requirements for SEMS?

Admission requirements vary depending on the specific program and university. Generally, students need a strong foundation in mathematics, including calculus and linear algebra. Some programs may also require coursework in economics and/or statistics.

#### 5. What are the unique features of SEMS programs?

- **Research opportunities:** SEMS offers students the chance to participate in faculty research projects, gaining hands-on experience and preparing for a career in research.
- **Internships and industry connections:** SEMS has partnerships with businesses and organizations, providing students with internship opportunities and exposure to potential career paths.
- **Access to state-of-the-art facilities:** Students have access to cutting-edge computer labs, statistical software, and research libraries.

**What is the principle of dental radiography?** This technique is based on the principle of aiming the central ray of the X-ray beam at  $90^\circ$  to an imaginary line which bisects the angle formed by the long axis of the tooth and the plane of the receptor. The image receptor is placed as close as possible to the tooth under investigation, without bending the packet.

**What are the basic principles of intraoral imaging?** Receptor Placement Errors  
Correctly exposing intraoral receptors includes four basic steps: receptor placement, vertical PID (cone) angulation alignment, horizontal PID (cone) angulation alignment, and central ray centering. Technique errors can occur if any of these steps are completed improperly.

**What are the benefits of dental imaging?** These images are helpful when diagnosing fractured or impacted teeth or evaluating the roots of your front teeth. Occlusal images can also help identify cysts, abscesses and jaw fractures. Pediatric

dentists may use occlusal X-rays to evaluate developing teeth.

**What is digital radiography in dentistry?** In this method we have an x-ray machine, an intraoral sensor and computer monitor. A sensor is placed into the mouth of the patient and exposed to x-ray, the sensor captures the radiographic image and then transmits the image into a computer monitor.

**What are the 5 principles of dentistry?** There are five fundamental principles that form the foundation of the ADA Code: patient autonomy, nonmaleficence, beneficence, justice and veracity. Principles can overlap each other as well as compete with each other for priority. More than one principle can justify a given element of the Code of Professional Conduct.

**What are the basic principles of X-ray?** Simply understood, the generation of X-rays occurs when electrons are accelerated under a potential difference and turned into electromagnetic radiation. [1] An X-ray tube, with its respective components placed in a vacuum, and a generator, make up the basic components of X-ray production.

**What are the principles of intraoral scanning?** In working principle, an intraoral scanner is a camera. Like a camera, it bounces light off an object. The scanner's lens then redirects the light back to a sensor, a single point to create a sharp image. With these images, it builds a dental model.

**What are the 3 intraoral films in dental radiography?** Periapical, bite-wing, and occlusal are three types of intraoral film used to reveal different dental structures.

**What is the basic principle of radiologic imaging?** CT, radiography, and fluoroscopy all work on the same basic principle: an X-ray beam is passed through the body where a portion of the X-rays are either absorbed or scattered by the internal structures, and the remaining X-ray pattern is transmitted to a detector (e.g., film or a computer screen) for recording or ...

**How is the dental imaging applied in the dental setting?** Intraoral Cameras: Intraoral cameras are small handheld devices that capture high-resolution images of the inside of the mouth. These images are displayed on a screen, allowing dentists to show patients their dental conditions and explain treatment options.

**What are the risks of dental imaging?** The risk from a single dental x-ray image is very small. However, some studies do show a slight increase in cancer risk, even at low levels of radiation exposure, particularly in children. To be safe, we do everything we can to keep the radiation exposure as low as possible.

**How do you prepare a patient for dental imaging?** Items such as headbands, bobby pins, hair clips, hearing aids, etc. must be removed prior to exposure. Removable partial dentures and orthodontic appliances should be taken out prior to imaging. Apron must not have a thyroid collar and should be placed properly so it does not block the x-ray beam.

**What are the three types of dental images?** In this blog post, we'll delve into the three main types of dental X-rays: bitewing, periapical, and panoramic X-rays. We'll explore their purposes, procedures, and how they aid dentists in ensuring your oral health.

**What are the disadvantages of dental radiography?** Disadvantage of Dental X-ray The problem is the amount of radiation emanating from the dental x-ray and the prospects for causing cancer that distresses many people. Ionizing radiation is a form of radiation that has enough energy to potentially cause damage to DNA.

**What is the goal of dental radiography?** Dental radiographs can alert your dentist to changes in your hard and soft tissues. In children, radiographs allow the dentist to see how their teeth and jawbones are developing. Like medical radiographs, dental radiographs allow your dentist to evaluate any injuries to your face and mouth.

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**What are the principles of radiograph taking?** Use only those views needed to complete the diagnostic task. The patient should be protected with a lead apron and thyroid collar to reduce body exposure to radiation. Follow recommendations to reduce radiation as low as reasonably achievable (ALARA). Use the fastest image

receptor available.

**What is the basic principle of conventional radiography?** For conventional radiography, an x-ray beam is generated and passed through a patient to a piece of film or a radiation detector, producing an image. Different soft tissues attenuate x-ray photons differently, depending on tissue density; the denser the tissue, the whiter (more radiopaque) the image.

**What is the principle of direct radiography?** In the direct conversion process, when x-ray photons impact over the photo conductor, like amorphous Selenium, they are directly converted to electronic signals which are amplified and digitised. As there is no scintillator, lateral spread of light photons is absent here, ensuring a sharper image.

## **Signals and Systems with MATLAB**

Signals and systems play a crucial role in various engineering and scientific fields. MATLAB is a powerful software that provides comprehensive capabilities for analyzing and processing signals and systems. Here are some frequently asked questions and answers on the topic:

**Q1: What is a signal?** A1: A signal is a function that represents information over time. It can be continuous (analog) or discrete (digital). Signals can take various forms, such as audio, video, temperature, or financial data.

**Q2: What is a system?** A2: A system is a mathematical model that describes how signals are processed or transformed. Systems can be linear or nonlinear, continuous or discrete. They can represent filters, amplifiers, or control systems.

**Q3: How to analyze signals and systems using MATLAB?** A3: MATLAB provides numerous functions for signal and system analysis. For example, you can use the 'plot' function to visualize signals, 'filter' function for filtering, and 'fft' function for frequency analysis. MATLAB also enables the design and simulation of systems using its Simulink environment.

**Q4: What are the advantages of using MATLAB for signals and systems?** A4: MATLAB offers several advantages, including:

- Extensive library of functions for signal and system processing
- Versatile programming environment for algorithm development
- Graphical user interface for interactive analysis and visualization
- Support for advanced techniques such as image processing and machine learning

**Q5: What are some applications of signals and systems in real-world scenarios?** A5: Signals and systems find applications in various domains, such as:

- Telecommunications: Signal transmission and processing in communication channels
- Biomedical engineering: Signal analysis for medical diagnosis and imaging
- Control systems: Designing and simulating feedback control systems for industries
- Robotics: Processing sensory signals for navigation and object recognition
- Data analysis: Signal processing for extracting insights from large datasets

**What are the Stata commands?** Most Stata commands are verbs. They tell Stata to do something: summarize, tabulate, regress, etc. Normally the command itself comes first and then you tell Stata the details of what you want it to do after. Many commands can be abbreviated: sum instead of summarize, tab instead of tabulate, reg instead of regress.

**What is the overview of Stata?** Stata is a powerful statistical package with smart data-management facilities, a wide array of up-to-date statistical techniques, and an excellent system for producing publication-quality tables and graphs.

**What is the basic function of Stata?** Stata provides mathematical functions, probability and density functions, matrix functions, string functions, functions for dealing with dates and time series, and a set of special functions for programmers. You can find all of these documented in the Stata Functions Reference Manual.

**What does the command test do in Stata?** test performs Wald tests of simple and composite linear hypotheses about the parameters of the most recently fit model. test supports svy estimators (see [SVY] svy estimation), carrying out an adjusted

Wald test by default in such cases. test can be used with svy estimation results, see [SVY] svy postestimation.

**What is the list command in Stata?** list, typed by itself, lists all the observations and variables in the dataset. If you specify varlist, only those variables are listed. Specifying one or both of in range and if exp limits the observations listed. list respects line size.

**What are logical commands in Stata?** In Stata, these expressions use one or more various relational and logical operators. The operators ==, ~=, !=, >, >=, <, and <= are used to test equality or inequality. The operators & | ~ and ! are used to indicate "and", "or", and "not".

**Is Stata difficult to learn?** With software, one is often faced with the choice of a program that is easy to learn (but limited) or one that is hard to learn and use (but powerful). Stata is both easy to learn and also very powerful. Stata is easy to learn in two ways.

**How to get an overview of data in Stata?** The describe command shows you basic information about a Stata data file. As you can see, it tells us the number of observations in the file, the number of variables, the names of the variables, and more.

**What are the disadvantages of Stata?** The biggest weakness of STATA is its visualization capabilities and its clunky output format. It takes some effort to make STATA graphs and regression output tables publication quality.

**Can you do calculations in Stata?** You can perform an immediate calculation as an aside without changing your data. 2. The syntax for these commands is the same, the command name followed by numbers, which are the summary statistics from which the statistic is calculated.

**What is the basic command for regression in Stata?** The basic linear regression command in Stata is simply regress [y variable] [x variables], [options] The regress command output includes an ANOVA table, but depending on the options you specify, this may not be relevant and might, in fact, be suppressed.

**What is Stata best used for?** Fast. Accurate. Easy to use. Stata is a complete, integrated software package that provides all your data science needs—data manipulation, visualization, statistics, and automated reporting.

**How to calculate p-value using Stata?**

**How to interpret test results in Stata?** STATA automatically takes into account the number of degrees of freedom and tells us at what level our coefficient is significant. If it is significant at the 95% level, then we have  $P > 0.05$ . If it is significant at the 0.01 level, then  $P > 0.01$ .

**What does prob > F mean in Stata?**  $\text{Prob} > F = 0.0000$  : This is the p-value of the model. It indicates the reliability of X to predict Y. Usually we need a p-value lower than 0.05 to show a statistically significant relationship between X and Y.  $R\text{-squared} = 0.8243$  : R-square shows the amount of variance of Y explained by X.

**What does == mean in Stata?** The double equals, ==, is used to test for equality. It is sometimes called logical equals because it is part of a logical test that returns either a one (true) or a zero (false).

**How to calculate standard error in Stata?**

**How to tabulate data in Stata?** Stata offers a variety of ways to tabulate data. The most basic table, `table [variable]`, will show the variable and the frequencies of each category, like so. This can also be done with more than one categorical variable, `table [variable1] [variable2] [variable 3] [variable etc]`.

**What is the unique command in Stata?** The command `unique` without a `by` reports the number of unique values for the varlist. With a `by` it does the same, but also creates a new variable (`_Unique` by default but can be named in the `gen` option). This new variable contains the number of unique values of the varlist for each level of the `by` variable.

**What does ## mean in Stata?** You can put a # between two variables to create an interaction—indicators for each combination of the categories of the variables. You can put ## instead to specify a full factorial of the variables—main effects for each variable and an interaction.



**What is != in Stata?** The relational operators are > (greater than), < (less than), >= (greater than or equal), <= (less than or equal), == (equal), and != (not equal).

**Can I learn Stata in one week?** We recommend investing 2 hours of learning per day. With that time investment, you will finish the course including the hands-on practices in 7 days.

**Which is better SPSS or Stata?** Conclusion. For complex data analysis, SPSS can be used and is a better option if one wants high productivity and outputs in generating data reports, Stata is considered and recommended choice.

**Should I learn Stata or Python?** Stata specializes in statistical analysis, especially for economics and social sciences. It offers an easier learning curve, powerful graphical capabilities, and strong data management features. Choose Python for complexity, integration, and broader applications.

**What does the Stata stand for?** The name Stata is a syllabic abbreviation of the words statistics and data. Stata's capabilities include data management, statistical analysis, graphics, simulations, regression, and custom programming. ( from Wikipedia)

**What are the Stata commands for statistics?** The statistics we can put in statistics( ) are following: mean (mean), count (count of nonmissing observations), n (same as count), sum (sum), max (maximum), min (mini- mum), range (range = max - min), sd (standard deviation), and variance (variance).

**What is R() in Stata?** Results of calculations are stored by many Stata commands so that they can be easily accessed and substituted into later commands. return list lists results stored in r(). ereturn list lists results stored in e(). sreturn list lists results stored in s().

**What is the syntax in Stata?** Syntax is the grammar of Stata commands. [by varlist]: command [varlist] [=exp] [if exp] [in range] [weight] [using filename][, options]

**What is the type command in Stata?** type lists the contents of a file stored on disk. This command is similar to the Windows type command and the Unix more(1) or pg(1) commands. In Stata for Mac and Stata for Unix, cat is a synonym for type. asis

specifies that the file be shown exactly as it is.

**What does == mean in Stata?** The double equals, ==, is used to test for equality. It is sometimes called logical equals because it is part of a logical test that returns either a one (true) or a zero (false).

**What coding does Stata use?**

**What is the basic command for regression in Stata?** The basic linear regression command in Stata is simply regress [y variable] [x variables], [options] The regress command output includes an ANOVA table, but depending on the options you specify, this may not be relevant and might, in fact, be suppressed.

**What is the structure of Stata?** specifies that the graph to be produced is a histogram of x1 with 10 bins. End all commands by hitting the ``Return" key. If a command goes beyond one line, keep typing -- the display will continue into the next line, and the command will not execute until you hit ``Return".

**How to code a variable in Stata?** The most basic form for creating new variables is generate newvar = exp, where exp is any kind of expression. Of course, both generate and replace can be used with if and in qualifiers. An expression is a formula made up of constants, existing variables, operators, and functions.

**What is the unique command in Stata?** The command unique without a by reports the number of unique values for the varlist. With a by it does the same, but also creates a new variable (\_Unique by default but can be named in the gen option). This new variable contains the number of unique values of the varlist for each level of the by variable.

**What is assert command in Stata?** Description. assert verifies that exp is true. If it is true, the command produces no output. If it is not true, assert informs you that the "assertion is false" and issues a return code of 9; see [U] 8 Error messages and return codes.

**What are the different types of variables in Stata?** Stata distinguishes between two types of variables: string and numeric variables. String variables may contain both characters and numbers, numeric variables only numbers. Generally – if possible -- commands apply to all variables if no variables are specified in a

command.

**What does ## mean in Stata?** You can put a # between two variables to create an interaction—indicators for each combination of the categories of the variables. You can put ## instead to specify a full factorial of the variables—main effects for each variable and an interaction.

**What is f in Stata?** The F statistic tests the hypothesis that all coefficients excluding the constant are zero. In other words, if we have a significant p-value for the overall F test, we can state that this model (i.e., the "package" of combined coefficients) is superior to the intercept-only model.

**What does ~= mean in Stata?** Sorted by: 4. From this page it appears that ~=. means Not Equal to a Missing Number .

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**Should I learn Stata or Python?** Stata specializes in statistical analysis, especially for economics and social sciences. It offers an easier learning curve, powerful graphical capabilities, and strong data management features. Choose Python for complexity, integration, and broader applications.

**Is Stata easier than R?** R is a programming language that allows you to go beyond what Stata can achieve. If you have a basic understanding of coding or are familiar with the coding environment. Stata, on the other hand, should be preferred over R if you have little or no coding experience.

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