

THE INVENTION OF SCIENCE A NEW HISTORY OF THE SCIENTIFIC REVOLUTION

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The Invention of Science: A New History of the Scientific Revolution

Q: What is the "invention of science"?

A: The "invention of science" refers to the emergence of a new way of understanding and investigating the natural world during the Scientific Revolution, which began in the 16th century. This period saw a shift away from traditional, qualitative approaches and towards quantitative, experimental methods.

Q: What were the key factors that led to the invention of science?

A: Several factors contributed to the invention of science, including the advent of new technologies (e.g., the telescope and the microscope), the influence of humanism and the Renaissance, and the patronage of wealthy patrons who supported scientific research.

Q: How did the invention of science impact our understanding of the world?

A: The invention of science had a profound impact on our understanding of the world. It led to the development of new theories in astronomy, physics, and biology, and it paved the way for modern scientific practices such as experimentation and hypothesis testing.

Q: What are the strengths and weaknesses of "The Invention of Science"?

A: "The Invention of Science" is a groundbreaking work that offers a fresh perspective on the Scientific Revolution. It is comprehensive and well-researched, and it provides a detailed account of the intellectual and cultural factors that shaped the development of science. However, some critics have argued that it overemphasizes the role of technology and de-emphasizes the social and political context of scientific discovery.

Q: What are the implications of the invention of science for our present understanding of the world?

A: The invention of science has had a lasting legacy on our present understanding of the world. It has shaped our ideas about the universe, the origin of life, and our place within it. It has also played a crucial role in the development of technology, medicine, and other fields that have improved our lives.

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Frequently Asked Questions

- **Is the 12th edition significantly different from previous editions?**

- Yes, the 12th edition includes updated content, particularly in the chapters on modern physics and astrophysics. It also features new pedagogical features and interactive simulations.

- **What online resources are available with the 12th edition?**

- The book comes with a suite of online resources, including interactive simulations, video tutorials, and quizzes. These resources are accessible through the publisher's website or via a companion app.

- **Is there a companion study guide for the 12th edition?**

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- To access the online resources, students need to register an account with the publisher's website. The registration process requires an access code, which can be found in the textbook or on the publisher's website.

Workday Inbound Provisioning with Azure AD: Now Available

Q1: What is Workday Inbound Provisioning? A1: Workday Inbound Provisioning is a feature that allows you to automatically create or update users, groups, and attributes in Azure Active Directory (Azure AD) based on changes made in Workday. This enables seamless provisioning of identities between your on-premises Workday system and your cloud-based Azure AD environment.

Q2: What are the benefits of using Workday Inbound Provisioning? A2: Workday Inbound Provisioning offers several benefits, including:

- Automated user and group management, reducing administrative overhead
- Improved data accuracy and consistency between Workday and Azure AD
- Enhanced security by ensuring that only authorized individuals have access to Azure AD resources

Q3: How do I get started with Workday Inbound Provisioning? A3: To set up Workday Inbound Provisioning, you will need to:

- Enable the feature in Azure AD
- Configure the connection between Workday and Azure AD
- Map Workday attributes to Azure AD attributes

Q4: What types of data can be provisioned from Workday to Azure AD? A4: Workday Inbound Provisioning supports the provisioning of the following data types:

- User attributes (e.g., name, email address, phone number)
- Group memberships
- Workday-specific attributes (e.g., cost center, job title)

Q5: How do I monitor and troubleshoot Workday Inbound Provisioning? A5: Azure AD provides various tools to help you monitor and troubleshoot Workday Inbound Provisioning, including:

- Provisioning logs
- Error reporting
- Advanced troubleshooting capabilities

Simulation: Sheldon Ross Solution

Question 1: A bank has one teller serving customers. The interarrival times between customers are exponentially distributed with a mean of 10 minutes. The service times are also exponentially distributed with a mean of 5 minutes. What is the average number of customers in the bank?

Answer: Using the steady-state solution to the M/M/1 queue, the average number of customers in the bank is:

$$L = \lambda / (\mu - \lambda)$$

where λ is the arrival rate, μ is the service rate, and L is the average number of customers. Plugging in the given values, we get:

$$L = 1 / (5 - 1) = 1 / 4 = 0.25 \text{ customers}$$

Question 2: A company has three servers who can handle incoming calls. The calls arrive according to a Poisson process with a rate of 10 calls per hour. The service times are exponentially distributed with a mean of 6 minutes. What is the probability that a call will have to wait?

Answer: Using the formula for the probability of waiting in an M/M/c queue, we get:

$$P(\text{Wait}) = (\lambda / c\mu)^c / (c\mu - \lambda)!(1 - \lambda / c\mu)^c$$

where λ is the arrival rate, c is the number of servers, μ is the service rate, and $P(\text{Wait})$ is the probability of waiting. Plugging in the given values, we get:

$$P(\text{Wait}) = (10 / 3 * 6)^3 / (3 * 6 - 10)!(1 - 10 / 3 * 6)^3 = 0.0279$$

Question 3: A hospital has two nurses who take care of patients. The patients arrive according to a Poisson process with a rate of 5 patients per hour. The service times are exponentially distributed with a mean of 12 minutes. What is the average time a patient spends in the hospital?

Answer: Using the steady-state solution to the M/M/c queue, the average time a patient spends in the hospital is:

$$W = (1 / \mu) * (1 + \lambda / c\mu)$$

where λ is the arrival rate, c is the number of servers, μ is the service rate, and W is the average time a patient spends in the hospital. Plugging in the given values, we get:

$$W = (1 / 12) * (1 + 5 / 2 * 12) = 0.42 \text{ hours} = 25.2 \text{ minutes}$$

Question 4: A call center has 10 servers who can handle incoming calls. The calls arrive according to a Poisson process with a rate of 20 calls per hour. The service times are exponentially distributed with a mean of 5 minutes. What is the probability that a call will be lost?

Answer: Using the formula for the probability of loss in an M/M/c queue, we get:

$$P(\text{Loss}) = (\lambda / c\mu)^c / (0! + 1! * (\lambda / c\mu) + 2! * (\lambda / c\mu)^2 + \dots + c! * (\lambda / c\mu)^{c-1})$$

where λ is the arrival rate, c is the number of servers, μ is the service rate, and $P(\text{Loss})$ is the probability of loss. Plugging in the given values, we get:

$$P(\text{Loss}) = (20 / 10 * 5)^{10} / (0! + 1! * (20 / 10 * 5) + 2! * (20 / 10 * 5)^2 + \dots + 10! * (20 / 10 * 5)^9)$$

Question 5: A manufacturing plant has a single machine that produces widgets. The production times are exponentially distributed with a mean of 20 minutes. The demand for widgets is Poisson distributed with a rate of 15 widgets per hour. What is the probability that the machine will be idle?

Answer: Using the formula for the probability of the server being idle in an M/M/1 queue, we get:

$$P(\text{Idle}) = 1 - \lambda / \mu$$

where λ is the arrival rate, μ is the service rate, and $P(\text{Idle})$ is the probability of the server being idle. Plugging in the given values, we get:

$$P(\text{Idle}) = 1 - 15 / 30 = 0.5$$

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