

# DISCRETE EVENT SYSTEM SIMULATION 3RD EDITION

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**What is a discrete-event simulation?** Discrete event simulation (DES) is a method of simulating the behaviour and performance of a real-life process, facility or system.

**What is the difference between discrete event and continuous simulation?** Discrete-event simulation, or DES, is intended to simulate systems where events occur at specific, separable instances in time. DES contrasts with a continuous simulation where events are tracked continuously. DES can be either deterministic or stochastic, depending on the nature of the target process.

**What does a discrete-event simulation model in supply chain management typically represent?** Discrete-event simulation focuses on the processes in a system at a medium level of abstraction. Typically, specific physical details, such as car geometry or train acceleration, are not represented. Discrete-event simulation modeling is widely used in the manufacturing, logistics, and healthcare fields.

**What is the difference between Monte Carlo and discrete-event simulation?** Monte Carlo simulation is appropriate for static systems that do not involve the passage of time. Discrete-event simulation is appropriate for dynamic systems where the passage of time plays a significant role.

**What is an example of a discrete-event simulation in manufacturing?** For example, Discrete Event Simulation software in a vehicle manufacturing facility would model the movement of a car part from Assembly into the Paint Shop as two events i.e. the departure event and the arrival event.

**What are the benefits of discrete-event simulation in manufacturing?** Discrete simulation software gives you a clearer picture of how changes will affect a live production environment before you go through the time and expense of implementing changes. Imagine a production line in an automotive factory.

**How is discrete-event simulation different from system dynamics?** The system dynamics method maps a problem onto a generic structure that can help understanding of the underlying causes behind the behaviour of the system. The discrete-event simulation technique attempts to replicate the structure of the system and then allows performance to be measured under a number of scenarios.

**What is an example of a discrete system?** A computer is a finite-state machine that may be viewed as a discrete system. Because computers are often used to model not only other discrete systems but continuous systems as well, methods have been developed to represent real-world continuous systems as discrete systems.

**What are the 3 differences of discrete and continuous?** The key differences are: Discrete data is the type of data that has clear spaces between values. Continuous data is data that falls in a constant sequence. Discrete data is countable while continuous — measurable.

**What are entities in discrete-event simulation?** The term entity is used here to designate a unit of traffic (a "transaction") within a model. Entities instigate and respond to events. An event is an instantaneous happening that changes the state of a model (or system).

**What is the difference between discrete-event simulation and agent-based simulation?** Agent-Based Simulation (ABS) ABS are considered as a variation of DES since in all virtually ABS, state changes to occur at a countable number of points in time. Agents are autonomous "entities" that can sense their environment and other agents within it and use this information in making decisions.

**Which of the following is a limitation of using discrete-event simulation?** Discrete event simulation (DES) has limitations in its application. One limitation is the need for clear presentation of model structure and simulation process to ensure

transparency and repeatability of research 1.

**What is the difference between discrete-event simulation and continuous simulation?** In the example shown to the right, the sales of a certain product over time is shown. Using a discrete event simulation makes it necessary to have an occurring event to change the number of sales. In contrast to this the continuous simulation has a smooth and steady development in its number of sales.

**Why not to use Monte Carlo simulation?** Assumption sensitivity: The accuracy of a Monte Carlo simulation heavily relies on the quality of the assumptions and inputs used. If the underlying assumptions are flawed or the input parameters are incorrectly specified, the simulation results can be misleading or inaccurate.

**What is the difference between continuous variable and discrete event control?** Discrete: Takes on distinct, countable values (e.g., number of children, shoe size). Continuous: Takes on any value within a range (e.g., weight, temperature, time).

**What is the difference between dynamic and discrete simulation?** Because of the level of aggregation system dynamic models tend to be relatively small in terms of the number of modelling elements they contain. Discrete event simulations tend to be rather complex, with each process modelled in detail.

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**What is a discrete event in probability?** Discrete events are those with a finite number of outcomes, e.g. tossing dice or coins. For example, when we flip a coin, there are only two possible outcomes: heads or tails. When we roll a six-sided die, we can only obtain one of six possible outcomes, 1, 2, 3, 4, 5, or 6.

**What is a discrete activity?** An activity that can be planned and measured and that yields a specific output. Note: Discrete effort is one of three earned value management (EVM) types of activities used to measure work performance). Discrete

effort is an activity that can be linked to a specific WBS output.

## **TCDSB School Report: Questions and Answers**

The Toronto Catholic District School Board (TCDSB) recently released its annual school report, providing a comprehensive overview of the board's performance. Here are some key questions and answers from the report:

### **1. What is the overall academic performance of TCDSB schools?**

TCDSB schools continue to perform above provincial averages in all major academic areas, including reading, writing, math, and science. The report reveals that students in TCDSB schools consistently achieve higher EQAO scores than their peers across the province.

### **2. How does TCDSB support students with special needs?**

TCDSB is committed to providing a supportive and inclusive environment for all students. The board offers a wide range of programs and services tailored to students with special needs, including individual education plans (IEPs), specialized classrooms, and assistive technology.

### **3. What initiatives are being taken to improve student well-being?**

Recognizing the importance of mental health and well-being, TCDSB has implemented several initiatives to support students. The board offers programs such as MindUP, a mindfulness and resilience-building curriculum, and promotes access to mental health resources and crisis support.

### **4. How is TCDSB addressing equity and diversity initiatives?**

TCDSB is actively working to promote equity and diversity in its schools. The board has implemented the Indigenous Education Policy Framework, which aims to create a welcoming and inclusive learning environment that respects and recognizes Indigenous perspectives and culture.

### **5. What are the highlights of the report?**

Some key highlights of the TCDSB school report include:

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- Improved EQAO results across all grades and subjects
- High student satisfaction rates
- Enhanced support for students with special needs
- Successful implementation of well-being initiatives
- Ongoing commitment to equity and diversity

## **Study Guide for Geometry: Houghton Mifflin Harcourt Answers**

### **1. Triangles**

- What are the different types of triangles based on angle measures?
- Answer: Acute (all angles  $< 90^\circ$ ), Obtuse (one angle  $> 90^\circ$ ), Right (one angle  $= 90^\circ$ )

### **2. Quadrilaterals**

- Name the four special parallelograms.
- Answer: Rectangle, Square, Rhombus, Trapezoid

### **3. Circles**

- What is a radius and a diameter?
- Answer: Radius is a line segment from the center to a point on the circle, diameter is a line segment passing through the center and connecting two points on the circle.

### **4. Similarity**

- Define similarity and state its properties.
- Answer: Similarity is a relationship between two shapes that have the same shape but may differ in size. Properties: Corresponding angles are congruent, corresponding sides are proportional.

### **5. Area and Volume**

- Find the formula for the area of a triangle and a circle.
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- Answer: Area of Triangle =  $\frac{1}{2}$  base height, Area of Circle =  $\pi * \text{radius}^2$

## **Toyota 4K Engine Manual: Troubleshooting and Repair**

The Toyota 4K engine is a reliable and durable engine that was used in a variety of Toyota vehicles from the 1970s to the 1990s. However, like all engines, the 4K can experience problems over time. This manual provides a comprehensive guide to troubleshooting and repairing common 4K engine issues.

**Q: What are the most common problems with the Toyota 4K engine?** A: The most common problems with the 4K engine include:

- Oil leaks
- Cooling system problems
- Ignition problems
- Fuel system problems
- Engine performance issues

**Q: How can I troubleshoot oil leaks from the 4K engine?** A: Oil leaks can occur from a variety of sources, including the valve cover gasket, oil pan gasket, and rear main seal. To troubleshoot oil leaks, first clean the engine to remove any dirt or debris. Then, start the engine and look for leaks. If you find a leak, use a flashlight to help you identify the source.

**Q: How can I troubleshoot cooling system problems with the 4K engine?** A: Cooling system problems can include overheating, coolant leaks, and water pump failure. To troubleshoot cooling system problems, first check the coolant level. If the coolant level is low, add coolant and check for leaks. If you find a leak, use a flashlight to help you identify the source. If the coolant level is not low, check the water pump. If the water pump is not circulating coolant, it will need to be replaced.

**Q: How can I troubleshoot ignition problems with the 4K engine?** A: Ignition problems can include difficulty starting, engine misfires, and no spark. To troubleshoot ignition problems, first check the spark plugs. If the spark plugs are worn or fouled, they will need to be replaced. Next, check the ignition coil. If the ignition coil is not producing a spark, it will need to be replaced.

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**Q: How can I troubleshoot fuel system problems with the 4K engine?** A: Fuel system problems can include hard starting, engine stalling, and poor fuel economy. To troubleshoot fuel system problems, first check the fuel filter. If the fuel filter is clogged, it will need to be replaced. Next, check the fuel pump. If the fuel pump is not delivering enough fuel, it will need to be replaced.

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