

# **Operations Research: Models, Algorithms, and Implementations**

2025-08-30

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# Preface

This is a Quarto book.

To learn more about Quarto books visit <https://quarto.org/docs/books>.

# Part I

# 1

## Inventory Management

**i** Note

JIT      Just In Time, JIT  
             JIT  
             Lean Manufacturing

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- 1.
- 2.

### Scientific Inventory Management

- 1.
- 2.

## 1.1

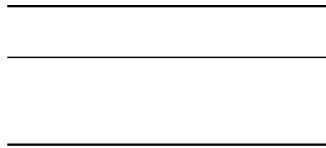
<b>demand</b>	(Deterministic)	Stochastic	
<b>review</b>	(Continuous Review)	(Periodic Review)	1
<b>lead time</b>		0	0
<b>backorder</b>			
<b>planning horizon</b>	(Single Period)	(Multi Period)	(Infinite)

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EOQ  
 Wagner-Whitin



## 1.2

<b>ordering cost</b>	1	fixed cost	1	$K$
<b>purchase cost</b>		$c$		
<b>stockout cost</b>		$p$		
<b>holding cost</b>		1	$h$	

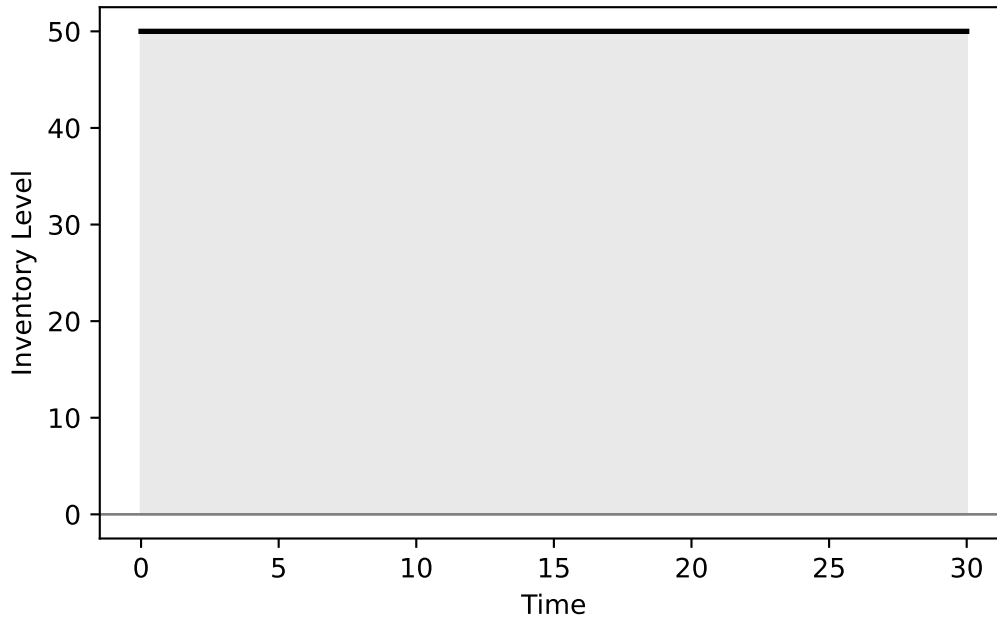
1 1  $h$  30 50  $30 \times 50 \times h = 1500h$

$\times h = 1500h$

```
import matplotlib.pyplot as plt
import numpy as np

t = np.linspace(0, 30, 1000)
inventory = np.full_like(t, 50)

# Plotting the inventory level
plt.fill_between(t, inventory, color="lightgray", alpha=0.5, label="Inventory Level")
plt.plot(t, inventory, label="Inventory Level", color="black", linewidth=2)
plt.xlabel("Time")
plt.ylabel("Inventory Level")
plt.axhline(0, color="gray", linewidth=1)
plt.tight_layout()
plt.show()
```

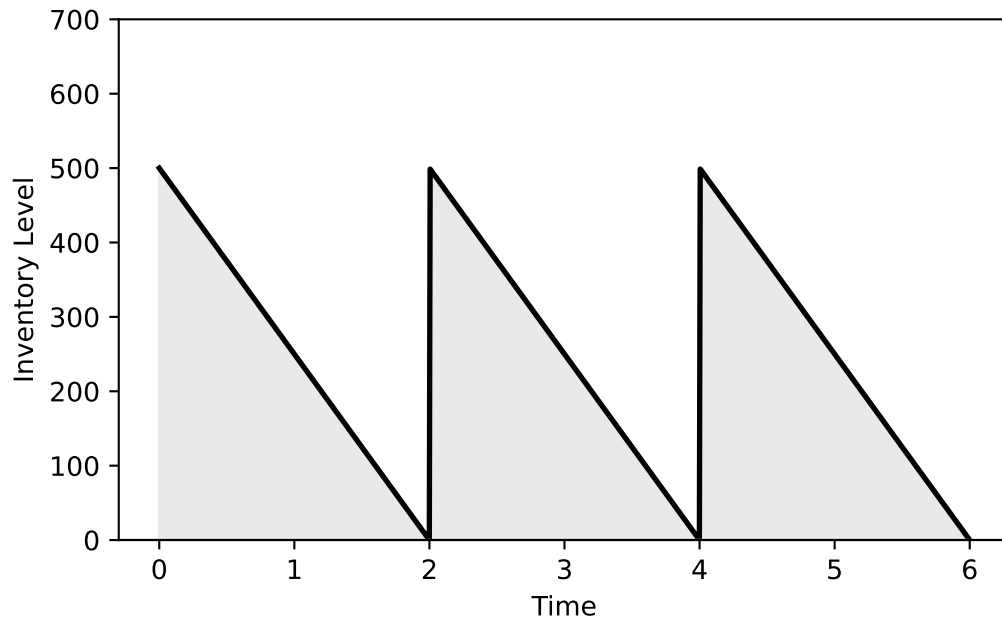


500 6

```
# Parameters
d = 250 # Demand rate
Q = 500 # Order quantity
T = Q / d # Cycle length
t = np.linspace(0, 2.999 * T, 1000)

# Inventory level over time
inventory = np.maximum(0, Q - (d * t) % Q)

# Plotting the inventory level
plt.fill_between(t, inventory, color="lightgray", alpha=0.5, label="Inventory Level")
plt.plot(t, inventory, label="Inventory Level", color="black", linewidth=2)
plt.xlabel("Time")
plt.ylabel("Inventory Level")
plt.axhline(0, color="gray", linewidth=1)
plt.ylim(bottom=0, top=Q + 200)
plt.tight_layout()
plt.show()
```



$$\frac{2 \times 500}{2} \times 3 \times h$$