**Solution 1**

**Given:**

1. Supply Function: Qs=50pQ\_s = 50pQs=50p
2. Demand Function: Qd=9900−10pQ\_d = 9900 - 10pQd=9900−10p where:

* QQQ is the quantity in liters.
* ppp is the price in thousands of rupees per liter.

# Initial Equilibrium Price and Quantity

At equilibrium, quantity supplied equals quantity demanded (Qs=QdQ\_s = Q\_dQs=Qd).

So:

50p=9900−10p50p = 9900 - 10p50p=9900−10p **Solving for ppp:**

50p+10p=990050p + 10p = 990050p+10p=9900 60p=990060p = 990060p=9900 p=990060=165p = \frac{9900}{60} = 165p=609900=165

Now, substitute p=165p = 165p=165 back into either the supply or demand equation to find QQQ.

For QsQ\_sQs:

Qs=50×165=8250 litersQ\_s = 50 \times 165 = 8250 \, \text{liters}Qs=50×165=8250liters

**Initial Equilibrium:**

* Equilibrium Price, p=165p = 165p=165 (thousands of rupees per liter)
* Equilibrium Quantity, Q=8250Q = 8250Q=8250 liters

**2) New Equilibrium Price and Quantity (with increased supply)**

With an increase in supply by 8000 liters at every price level, the new supply equation becomes: Qs=50p+8000Q\_s = 50p + 8000Qs=50p+8000

Now, set the new QsQ\_sQs equal to the demand function to find the new equilibrium.

50p+8000=9900−10p50p + 8000 = 9900 - 10p50p+8000=9900−10p **Solving for ppp:**

50p+10p=9900−800050p + 10p = 9900 - 800050p+10p=9900−8000 60p=190060p =

190060p=1900 p=190060≈31.67p = \frac{1900}{60} \approx 31.67p=601900≈31.67 Now substitute p=31.67p = 31.67p=31.67 back into the new supply function to find QQQ.

For QsQ\_sQs:

Qs=50×31.67+8000≈9583.5 litersQ\_s = 50 \times 31.67 + 8000 \approx 9583.5 \, \text{liters}Qs

=50×31.67+8000≈9583.5liters **New Equilibrium:**

* New Equilibrium Price, p≈31.67p \approx 31.67p≈31.67 (thousands of rupees per liter)
* New Equilibrium Quantity, Q≈9583.5Q \approx 9583.5Q≈9583.5 liters

**3) Price Elasticity of Demand and Price Elasticity of Supply at Initial Equilibrium**

The formulas for price elasticity of demand and supply are:

Ed=dQddP×PQE\_d = \frac{dQ\_d}{dP} \times \frac{P}{Q}Ed=dPdQd×QP Es=dQsdP×PQE\_s = \frac{dQ\_s}{dP} \times \frac{P}{Q}Es=dPdQs×QP *a) Price Elasticity of Demand*

From Qd=9900−10pQ\_d = 9900 - 10pQd=9900−10p:

dQddP=−10\frac{dQ\_d}{dP} = -10dPdQd=−10

Using P=165P = 165P=165 and Q=8250Q = 8250Q=8250:

Ed=−10×1658250=−0.2E\_d = -10 \times \frac{165}{8250} = -0.2Ed=−10×8250165=−0.2

*b) Price Elasticity of Supply*

From Qs=50pQ\_s = 50pQs=50p:

dQsdP=50\frac{dQ\_s}{dP} = 50dPdQs=50

Using P=165P = 165P=165 and Q=8250Q = 8250Q=8250:

Es=50×1658250=1E\_s = 50 \times \frac{165}{8250} = 1Es=50×8250165=1

**Interpretation:**

* **Price Elasticity of Demand ( Ed=−0.2E\_d = -0.2Ed=−0.2 ):** The demand for Cola Next is **inelastic**, meaning a 1% increase in price would lead to only a 0.2% decrease in quantity demanded.
* **Price Elasticity of Supply ( Es=1E\_s = 1Es=1 ):** The supply of Cola Next is **unit elastic**, meaning a 1% increase in price would result in a 1% increase in quantity supplied.

This reflects that demand is less responsive to price changes than supply in the initial market conditions.

**Solution 2**

To solve these questions, let's go through each requirement step-by-step.

## Given Data

* **Initial Supply Function:** Qs=50pQ\_s = 50pQs=50p
* **Initial Demand Function:** Qd=9900−10pQ\_d = 9900 - 10pQd=9900−10p Where:
* QQQ is in liters
* ppp is in thousands per liter

## Step 1: Calculate the Initial Equilibrium Price and Quantity

The equilibrium occurs where quantity demanded equals quantity supplied, so:

Qd=QsQ\_d = Q\_sQd=Qs

Substitute the values from the supply and demand functions

9900−10p=50p9900 - 10p = 50p9900−10p=50p

Solve for ppp:

1. Add 10p10p10p to both sides: 9900=60p9900 = 60p9900=60p
2. Divide by 60: p=990060=165p = \frac{9900}{60} = 165p=609900=165

Now, substitute p=165p = 165p=165 back into either the supply or demand function to find the equilibrium quantity QQQ:

Qs=50×165=8250Q\_s = 50 \times 165 = 8250Qs=50×165=8250

So, the initial equilibrium price and quantity are:

* **Price:** 165 (thousand per liter)
* **Quantity:** 8250 liters

## Step 2: Calculate the New Equilibrium Price and Quantity with Increased Supply

With the increase in supply, the new supply function becomes:

Qs=50p+8000Q\_s = 50p + 8000Qs=50p+8000

Setting the new supply function equal to the demand function:

9900−10p=50p+80009900 - 10p = 50p + 80009900−10p=50p+8000

Solve for ppp:

1. Add 10p10p10p to both sides: 9900=60p+80009900 = 60p + 80009900=60p+8000
2. Subtract 8000 from both sides: 1900=60p1900 = 60p1900=60p
3. Divide by 60: p=190060≈31.67p = \frac{1900}{60} \approx 31.67p=601900≈31.67

Now, substitute p=31.67p = 31.67p=31.67 back into the new supply function to find the new equilibrium quantity QQQ:

Qs=50×31.67+8000≈9833.5Q\_s = 50 \times 31.67 + 8000 \approx 9833.5Qs=50×31.67+8000≈9833.5

So, the new equilibrium price and quantity are:

* **Price:** 31.67 (thousand per liter)
* **Quantity:** 9833.5 liters

## Step 3: Calculate the Price Elasticity of Demand and Supply at the Initial Equilibrium

*Price Elasticity of Demand (PED)*

The price elasticity of demand is given by the formula:

PED=dQddP×PQd\text{PED} = \frac{dQ\_d}{dP} \times \frac{P}{Q\_d}PED=dPdQd×QdP

For the demand function Qd=9900−10pQ\_d = 9900 - 10pQd=9900−10p:

* dQddP=−10\frac{dQ\_d}{dP} = -10dPdQd=−10
* Initial equilibrium values are P=165P = 165P=165 and Qd=8250Q\_d = 8250Qd=8250

So,

PED=−10×1658250=−0.2\text{PED} = -10 \times \frac{165}{8250} = -0.2PED=−10×8250165=−0.2 *Price Elasticity of Supply (PES)*

The price elasticity of supply is given by the formula:

PES=dQsdP×PQs\text{PES} = \frac{dQ\_s}{dP} \times \frac{P}{Q\_s}PES=dPdQs×QsP

For the supply function Qs=50pQ\_s = 50pQs=50p:

* dQsdP=50\frac{dQ\_s}{dP} = 50dPdQs=50
* Initial equilibrium values are P=165P = 165P=165 and Qs=8250Q\_s = 8250Qs=8250

So,

PES=50×1658250=1\text{PES} = 50 \times \frac{165}{8250} = 1PES=50×8250165=1

*Interpretation*

* **PED (-0.2):** The demand is inelastic, meaning that a change in price leads to a proportionally smaller change in quantity demanded.
* **PES (1):** The supply is unit elastic, indicating that a change in price leads to a proportional change in quantity supplied.

## Summary of Results

1. **Initial Equilibrium Price and Quantity:**
   * Price: 165 (thousand per liter) o Quantity: 8250 liters
2. **New Equilibrium Price and Quantity after Increase in Supply:**
   * Price: 31.67 (thousand per liter) o Quantity: 9833.5 liters
3. **Price Elasticities:**
   * PED: -0.2 (Demand is inelastic)