Let the demand and supply functions be represented by \( D(p) \) and \( S(p) \), where \( p \) is the price in dollars.

\[
D(p) = 4000 - 35p \quad S(p) = 95p
\]

A. Find the price when the demand is 2700. Is there a surplus or a shortage at this price? (3 Points)

Using \( D(p) \),

\[
2700 = 4000 - 35p
\]

\[
-1300 = -35p \Rightarrow p = -1300/-35 = 37.14 \Rightarrow \text{price} = $37.14
\]

\[
S(p) = S(37.14) = 95(37.14) = 3528.3
\]

\( S = 3528.3 > D = 2700 \) when the price, \( p = $37.14 \) so there is a surplus.

**In general, you must support surplus with the statement \( S > D \) and shortage with the statement \( S < D \).**

B. Find the equilibrium price and demand (supply) for the given functions. (3 Points)

Solve \( D = S \)

\[
4000 - 35p = 95p
\]

\[
4000 = 130p \quad P = 4000/130 = 30.77 \quad ; \quad \text{therefore} \quad p = $30.77
\]

and \( S(30.77) = 95*30.77 = 2923.15 \)

Then, the **equilibrium price and demand (supply) = ($30.77, 2923.15)**

C. At what prices is there a surplus? (3 Points)

For prices \( p > $30.77 \)

D. At what prices is there a shortage? (3 Points)

For prices \( p < $30.77 \)

**In general, for the Supply/Demand problems that are covered in this course, surplus is when \( p > \) equilibrium price and shortage is when \( p < \) equilibrium price.**
(x_1, y_1) \\
(x_2, y_2) \\
\[ m = \frac{y_2 - y_1}{x_2 - x_1} \quad y = mx + b \quad y - y_1 = m(x - x_1) \]

2) Write the equation of the line through (-15, -3) with 
   slope \( m = \frac{3}{5} \) 

   **Method 1:** You can use the point-slope formula as follows: 
   \[ y - y_1 = m(x-x_1) \]
   \[ y - (-3) = \frac{3}{5}(x-(-15)) \]
   \[ y + 3 = \frac{3}{5}x + 9 \]
   \[ y = \frac{3}{5}x + 9 - 3 \]
   \[ y = \frac{3}{5}x + 6 \]

   **Method 2:** Use the slope-intercept form as follows: 
   \[ y = mx + b \]
   \[ -3 = \frac{3}{5}(-15) + b \]
   \[ -3 = -9 + b \]
   \[ -3 + 9 = -9 + b + 9 \]
   \[ 6 = b \]
   \[ y = \frac{3}{5}x + 6 \]

3) Write the equation of the line through (-6, 2) and (-7, 5) 

   \[ m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-2}{-7-(-6)} = -3 \]
   \[ y - 2 = -3(x - (-6)) \]
   \[ y - 2 = -3x - 6 \]
   \[ y = -3x - 16 \]