A.APR.D.7: Rational Inequalities

1. Which graph represents the solution set of \( \frac{x + 16}{x - 2} \leq 7\)?

   1)  
   2)  
   3)  
   4)  

2. The cost \( C \) of selling \( x \) calculators in a store is modeled by the equation \( C = \frac{3,200,000}{x} + 60,000 \). The store profit \( P \) for these sales is modeled by the equation \( P = 500x \). What is the minimum number of calculators that have to be sold for profit to be greater than cost?
A.APR.D.7: Rational Inequalities

Answer Section

1  ANS: 3

\[ \frac{x + 16}{x - 2} - \frac{7(x - 2)}{x - 2} \leq 0 \]

-6x + 30 = 0 \hspace{1cm} x - 2 = 0

x = 2

\[ \frac{-6x + 30}{x - 2} \leq 0 \]

x = 5

\[ \frac{-6(1) + 30}{1 - 2} = \frac{24}{-1} = -24, \text{ which is less than } 0. \]

If \( x = 3 \), \[ \frac{-6(3) + 30}{3 - 2} = \frac{12}{1} = 12, \text{ which is greater than } 0. \]

If \( x = 6 \), \[ \frac{-6(6) + 30}{6 - 2} = \frac{-6}{4} = \frac{3}{2}, \text{ which is less than } 0. \]

REF: 011424a2

2  ANS:

\[ \frac{3,200,000}{x} + 60,000 < 500x. \]

-500x + 60,000 + \( \frac{3,200,000}{x} \) < 0

x < 160 and x < 40

\[ x - 120 - \frac{6,400}{x} > 0 \]

x < 160 and x < 40

or

\[ x - 160 > 0 \text{ and } x + 40 > 0 \]

\[ x^2 - 120x - 6400 > 0 \]

x > 160 and x > 40

\[ (x - 160)(x + 40) > 0 \]

x > 160

REF: 080227b