



Activity 7.3 Solutions – Graph Analysis with the TI-84

1. $Y1(t) = 0.169t^3 - 1.571t^2 + 3.778t + 1.370$ million barrels per day, where t is years after 2008, $0 \leq t \leq 6$.

2. (a) $t = 0.55$ years after 2008 \rightarrow in 2009
 $t = 3.10$ years after 2008 \rightarrow in 2012
 $t = 5.67$ years after 2008 \rightarrow in 2014

(b) $Y1(1) = 3.75$ million barrels per day

(c) $Y1'(1) = 1.14$; This is an increase of 1.14 million barrels per day per year.

(d) At $t = 1.63$ (2010), the surplus was at a maximum of $Y1 = 4.08$ million barrels per day.

(e) At $t = 4.59$ (2013), the surplus was at a minimum of $Y1 = 1.91$ million barrels per day.

3. $Y1'(t) = 0.506t^2 - 3.143t + 3.778$ million barrels per day per year, where t is years after 2008, $0 \leq t \leq 6$.

(a) $Y1'(t) = 0$ when $t = 1.63$ and changes from positive to negative there. This verifies the local maximum at $t = 1.63$.

$Y1'(t) = 0$ when $t = 4.58$ and changes from negative to positive there. This verifies the local minimum at $t = 4.58$.

(b) The point of most rapid decline corresponds to the minimum of the slope graph, which occurs at $t = 3.11$. This corresponds to the year 2012. Algebraically,

$$Y1''(t) = 1.012t - 3.143 = 0 \text{ when } t = 3.11.$$

(c) $Y1'(3.11) = -1.10$; This is a decrease of 1.10 million barrels per day per year.