like #28 on p.436

Precalc Sec. 5.6 Sinusoidal curve fitting

The longest day of the year (in terms of hours of sunlight) occurs on the day of the summer solstice. In 2005, the summer solstice occurred on June 21 (the 172nd day of the year) and the winter solstice occurred on December 21 (the 355th day of the year)

According to the *Old Farmer's Almanac*, the number of hours of sunlight in Boston on the summer solstice is 15.283 and the number of hours of sunlight on the winter solstice is 9.067.

A) Make a sketch of the function
B) Find both a sine and cosine equation that fits the data
C) Use either function found in part B to predict the number of hours of sunlight on April 1, the 91st day of the year.

per = 365 Days ; Amp = $\frac{15.283 - 9.067}{2} = 3.108$; d = $\frac{15.283 + 9.067}{2} = 12.175$

$b = \frac{2\pi}{per} = \frac{2\pi}{365}$; $\frac{365}{4} = 91.25 \rightarrow PS = 172 - 91.25 = 80.75 \rightarrow \sin$

$172 \rightarrow \cos$

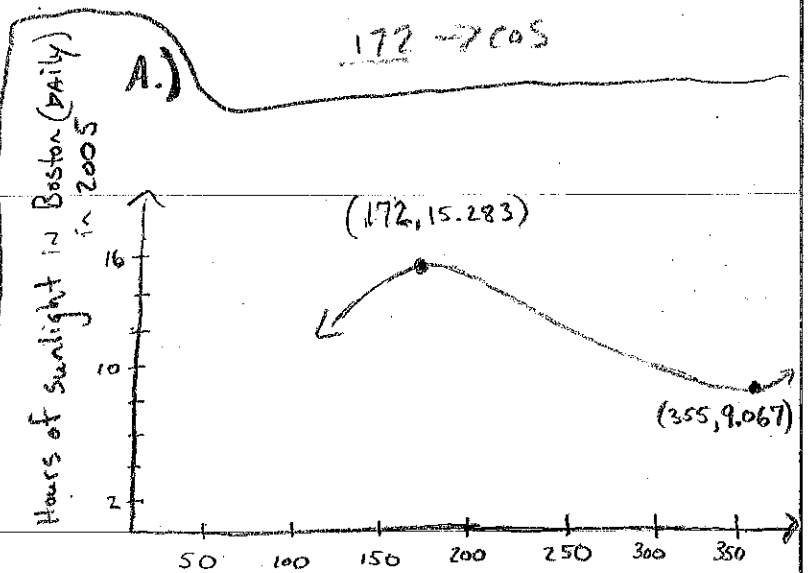
$c = b \cdot PS = \frac{2\pi}{365} \cdot 80.75 = 1.39 \rightarrow \sin$

$c = b \cdot PS = \frac{2\pi}{365} \cdot 172 = 2.961 \rightarrow \cos$

B.) $y = 3.108 \sin\left(\frac{2\pi}{365}x - 1.39\right) + 12.175$

$y = 3.108 \cos\left(\frac{2\pi}{365}x - 2.961\right) + 12.175$

A.)



C.) $y = 3.108 \sin\left[\frac{2\pi}{365}(91) - 1.39\right] + 12.175$

$y = 12.721$ hrs