

### 3.7 Sinusoidal Function Context and Data Modeling

AP Precalculus

Name: \_\_\_\_\_

**CA #2**

1. The following data set can be modeled by a sinusoidal function. Use the data to answer each problem below.

$x$	0	1	2	3	4	5	6	7	8	9
$f(x)$	216	99	-20	-98	-30	101	245	304	238	104

$x$	10	11	12	13	14	15	16	17	18	19
$f(x)$	-18	-105	-22	107	236	299	241	96	22	-102

- a. Estimate the period and frequency.
- b. Estimate the vertical shift (midline).
- c. Estimate the amplitude.

- d. Using the above information, create a sinusoidal function model.

- e. Using a calculator, find a sinusoidal model from the given data set. Your answer should look similar to your estimate in part d.

2. The following data set can be modeled by a sinusoidal function. Use the data to answer each problem below.

$x$	0	1	2	3	4	5	6	7	8	9
$f(x)$	150	251	348	249	151	250	350	248	146	247

$x$	10	11	12	13	14	15	16	17	18	19
$f(x)$	355	252	153	260	351	240	150	248	347	246

- a. Estimate the period and frequency.
- b. Estimate the vertical shift (midline).
- c. Estimate the amplitude.

d. Using the above information, create a sinusoidal function model.

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e. Using a calculator, find a sinusoidal model from the given data set. Your answer should look similar to your estimate in part d.

Answers to 3.7 CA #2

1a. Period: 8 Frequency: $\frac{1}{8}$	1b. $y = 100$	1c. 200	1d. $f(x) = 200 \sin\left(\frac{\pi}{4}[x - 5]\right) + 100$ or $f(x) = 200 \sin\left(\frac{\pi}{4}[x + 3]\right) + 100$ or $f(x) = 200 \cos\left(\frac{\pi}{4}[x - 7]\right) + 100$
1e. $f(x) = 190.051 \sin(0.779x + 2.409) + 104.955$			
2a. Period: 4 Frequency: $\frac{1}{4}$	2b. $y = 250$	2c. 100	2d. $f(x) = 100 \sin\left(\frac{\pi}{2}[x - 1]\right) + 250$ or $f(x) = 100 \cos\left(\frac{\pi}{2}[x - 2]\right) + 250$
2e. $f(x) = 100.127 \sin(1.573x - 1.574) + 249.722$			