Algebra 2 / Trigonometry (H) NOTES 14.5 Modeling with Trigonometric Functions

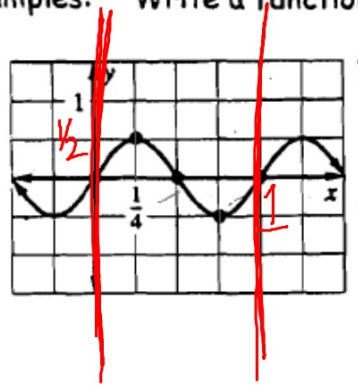
Sinusoids are graphs of sine and cosine functions. The equations we will use are

$$y = a \sin b(x - h) + k \quad \text{or} \quad y = a \cos b(x - h) + k$$

where $|a|$ is the amplitude, $\frac{2\pi}{|b|}$ is the period, h is the horizontal shift, and k is the vertical shift.

Examples: Write a function for each sinusoid.

1.

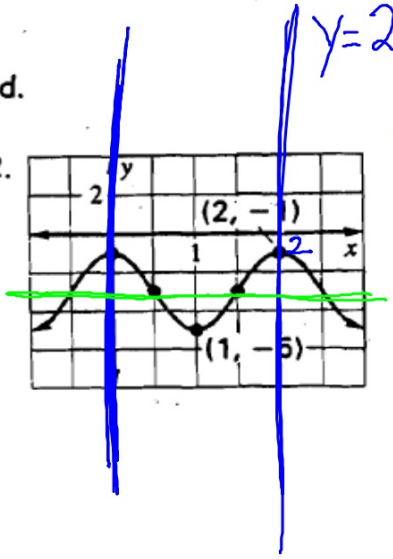


per = 1, b = 2π

a = ½

$y = \frac{1}{2} \sin 2\pi x$

2.



$y = 2 \cos \pi x - 3$

per = 2

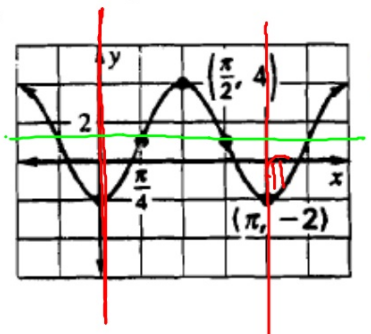
b = π

$k = \frac{\text{MAX} + \text{min}}{2} = \frac{-1 + -5}{2}$

k = −3

a = 2

3.



per = π

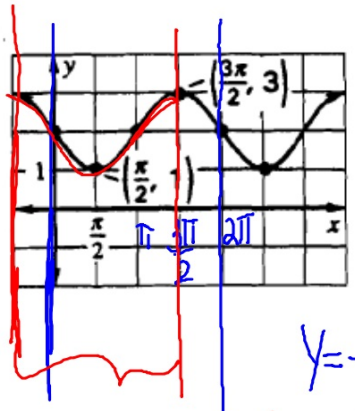
b = 2

K = $\frac{4 + -2}{2} = 1$

|a| = 3 flip

$y = -3\cos 2x + 1$

4.



per = 2π (b=1)

K = 2

|a| = 1

flip

$y = -\sin x + 2$

$y = \cos(x + \frac{\pi}{2}) + 2$

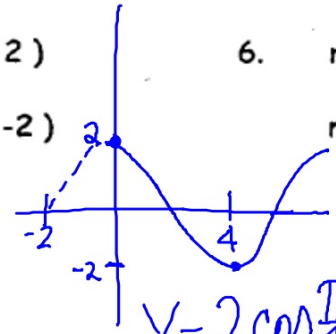
5. maximum point at (0, 2)

minimum point at (4, -2)

$\frac{2\pi}{b} = 8$ per = 8

b = $\pi/4$

a = 2



$y = 2\cos\frac{\pi}{4}x$

6. maximum point at $(\frac{\pi}{4}, 5)$

minimum point at $(\frac{3\pi}{4}, -1)$

per = π

b = 2

K = 2

a = 3

$y = 3\sin 2x + 2$