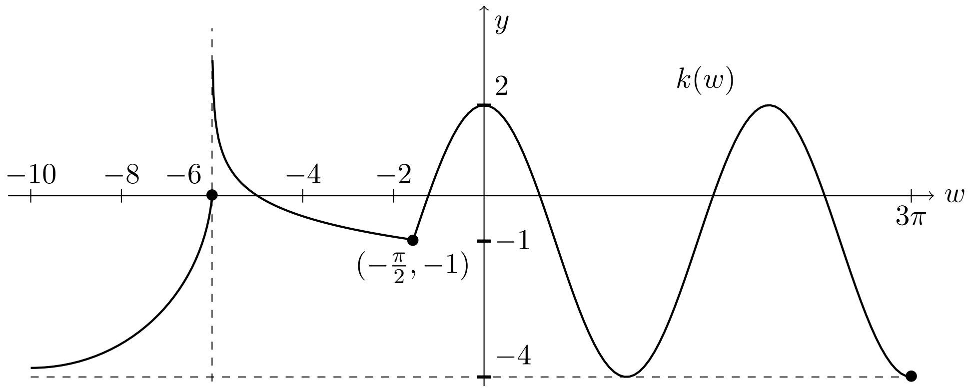
7. [17 points] The function $k(w)$ has domain $(-\infty, 3\pi]$. The graph of $k(w)$ for $-10 \le w \le 3\pi$ is shown in the picture below:



Assume that the behavior of the graph for w in $(-\infty, -10)$ continues as shown. Moreover, the following are true for the function $k(w)$:

- $\lim_{w \to -6^+} k(w) = +\infty$
- $k(w)$ has a horizontal asymptote $y = -4$.
- $k(w) = A\cos(w) + c$, for $-\pi/2 \le w \le 3\pi$.

a. [4 points] Find the values of A and c.

Solution:
$A = 3$ and $c = -1$.

b. [9 points] Fill in the blanks in the following sentences. You can use either interval notation or inequalities, wherever it is needed:

i. The domain of the function $k(-\frac{1}{4}(w-4))$ is $[-12\pi + 4, +\infty)$.

ii. $\lim_{w \to +\infty} -3k(-w) + 1 =$ 13.

iii. The vertical asymptote of the graph of $k(2018w + 2019)$ is $w = -\frac{2025}{2018}$.

c. [4 points] Let $g(w) = -k(5w) - 1.5$. Find the coordinates of the point on the graph of k that correspond to the point $(\frac{2\pi}{5}, -3.5)$ on the graph of g.

Solution: $g(\frac{2\pi}{5}) = -3.5$ leads to:

$$-k\left(5\frac{2\pi}{5}\right) - 1.5 = -3.5$$
$$-k(2\pi) = -2$$
$$k(2\pi) = 2$$

The point on the graph of k is (2π , 2).