

1. [14 points] No work or explanation is expected on this page.
- a. [4 points] If the graph of the function $y = k(w)$ has a vertical asymptote $w = 5$ and a horizontal asymptote $y = 3$, then what, if any, asymptotes does the graph of $y = 2k(4w) + 3$ have? (Write “None” in the blank if no asymptotes of that type can be found from the information provided.)

Vertical: _____ **Horizontal:** _____

- b. [2 points] If the function $f(q)$ has a zero $q = -2$, find a zero of the function $4f(3(q - 1))$.

Answer: _____

- c. [2 points] Is the function $p(t) = \sin(t) + \pi$ even, odd, or neither? *Circle ONE answer.*

even

odd

neither even nor odd

- d. [2 points] Is there a number whose natural log is 8,675,309? *Circle ONE answer.*

yes

no

- e. [4 points] Suppose $\cos(\phi) = -0.6$ and $\pi \leq \phi \leq 2\pi$. Find $\sin(\phi)$ and $\tan(\phi)$.

Answers: $\sin(\phi) =$ _____ $\tan(\phi) =$ _____