

College Algebra Quiz 4

Name _____ Score _____

Please Print Clearly

Circle the correct response

1. **T** **F** If t is a zero of multiplicity k and k is an odd number, the graph crosses the x -axis at $(t, 0)$.
2. **T** **F** If t is a zero of multiplicity k and k is an even number, the graph crosses the x -axis at $(t, 0)$.
3. **T** **F** The graph of a polynomial function is a continuous smooth graph with no sharp corners.
4. **T** **F** The graph of a rational function is a continuous smooth graph with no sharp corners.
5. What are the possible rational zeros of the function whose rule is $f(x) = 2x^5 - 2x + 1$

If $\frac{p}{q}$ is a rational zero of f , then

$$p \in \{\pm 1\}, \quad q \in \{\pm 1, \pm 2\}, \quad \text{and} \quad \frac{p}{q} \in \left\{ \pm 1, \pm \frac{1}{2} \right\}$$

6. Does the function in Question 5 have any rational zeros?
If yes, what are they. If no, why not.

$$f(1) = 2 - 2 + 1 = 1 \neq 0 \Rightarrow 1 \text{ is not a zero of } f$$

$$f(-1) = -2 + 2 + 1 = 1 \neq 0 \Rightarrow -1 \text{ is not a zero of } f$$

$$f\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^5 - 2\left(\frac{1}{2}\right) + 1 = \frac{1}{2^4} - 1 + 1 = \frac{1}{2^4} \neq 0 \Rightarrow \frac{1}{2} \text{ is not a zero of } f$$

$$f\left(-\frac{1}{2}\right) = 2\left(-\frac{1}{2}\right)^5 - 2\left(-\frac{1}{2}\right) + 1 = \frac{-1}{2^4} + 1 + 1 = \frac{-1}{2^4} + 2 \neq 0 \Rightarrow -\frac{1}{2} \text{ is not a zero of } f$$

The function f has no rational zeros because all possible rational zeros have been tested and none satisfy the definition of zero of a function.

7. Does the function in Question 5 have any real zeros?
If yes, explain why. If no, explain why not.

Complex zeros of polynomial functions occur in conjugate pairs so if there are complex zeros there must be an even number of them. That means a polynomial of odd degree must have at least one real zero.

The function f in Problem 5 has at least one real zero because f is a fifth degree (the degree is odd) polynomial function.