Quiz 1.16

Name _____

1.

x	-2	-1	0	1	2	3
$f(x)$	-2	5	2	-4	-1	3

Selected values of a continuous function f are given in the table above. What is the fewest possible number of zeros of f in the interval $[-2, 3]$?

(A) Zero

(B) One

(C) Two

(D) Three

2.

x	0	1	3	7
$g(x)$	24	35	42	68

The table above gives values of a function g at selected values of x. Which of the following statements, if true, would be sufficient to conclude that there exists a number c in the interval $[0, 7]$ such that $g(c) = 50$?
1. g is defined for all x in the interval $[0, 7]$.
2. g is increasing for all x in the interval $[0, 7]$.
3. g is continuous for all x in the interval $[0, 7]$.

(A) II only

(B) III only

(C) I and III only

(D) I, II, and III

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3. ▦ Let f be the function given by $f(x) = \dfrac{9 + 2xe^{-\frac{x}{4}}}{\cos\left(\frac{x}{2}\right)}$. The Intermediate Value Theorem applied to f on the

closed interval $[24, 28]$ guarantees a solution in $[24, 28]$ to which of the following equations?

(A) $f(x) = 0$

(B) $f(x) = 9.090$

(C) $f(x) = 12.235$

(D) $f(x) = 76.999$

4. NO CALCULATOR IS ALLOWED FOR THIS QUESTION.

Show all of your work, even though the question may not explicitly remind you to do so. Clearly label any functions, graphs, tables, or other objects that you use. Justifications require that you give mathematical reasons, and that you verify the needed conditions under which relevant theorems, properties, definitions, or tests are applied. Your work will be scored on the correctness and completeness of your methods as well as your answers. Answers without supporting work will usually not receive credit.

Unless otherwise specified, answers (numeric or algebraic) need not be simplified. If your answer is given as a decimal approximation, it should be correct to three places after the decimal point.

Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

$$F(t) = \begin{cases} 2^{t+1} - 2 & \text{for } 0 \leq t < 7 \\ \dfrac{800t - 4800}{t - 4} & \text{for } t \geq 7 \end{cases}$$

The amount of money raised during a fund-raising campaign is modeled by the function F defined above, where $F(t)$ is measured in United States dollars and t is the time in days since the campaign began.

(a)   Find $\displaystyle\lim_{t \to \infty} F(t)$. Explain the meaning of $\displaystyle\lim_{t \to \infty} F(t)$ in the context of the problem.

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> ✐ Please respond on separate paper, following directions from your teacher.

(b)   Is the function F continuous at $t = 7$? Justify your answer.

> ✐ Please respond on separate paper, following directions from your teacher.

(c)   The amount of money raised during a competing fund-raising campaign is modeled by the function M defined by $M(t) = \dfrac{240(2^t - 1)}{(2^t + 36)}$, where $M(t)$ is measured in United States dollars and t is the time in days since that campaign began. According to this model, is there a time t, for $0 \le t \le 2$, at which the amount of money raised is 10 dollars? Justify your answer.

> ✐ Please respond on separate paper, following directions from your teacher.