

# Classroom Voting Questions: Precalculus

## 1.7 Introduction to Continuity

1. A drippy faucet adds one milliliter to the volume of water in a tub at precisely one-second intervals. Let  $f$  be the function that represents the volume of water in the tub at time  $t$ . Which of the following statements is correct?
  - (a)  $f$  is a continuous function at every time  $t$
  - (b)  $f$  is continuous for all  $t$  other than the precise instants when the water drips into the tub.
  - (c)  $f$  is not continuous at any time  $t$ .
  - (d) There is not enough information to know where  $f$  is continuous.
  
2. A drippy faucet adds one milliliter to the volume of water in a tub at precisely one second intervals. Let  $g$  be the function that represents the volume of water in the tub as a function of the depth of the water,  $x$ , in the tub. Which of the following statements is correct?
  - (a)  $g$  is a continuous function at every depth  $x$ .
  - (b) there are some values of  $x$  at which  $g$  is not continuous.
  - (c)  $g$  is not continuous at any depth,  $x$ .
  - (d) not enough information is given to know where  $g$  is continuous.
  
3. You know the following statement is true:

If  $f(x)$  is a polynomial, then  $f(x)$  is continuous.

Which of the following is also true?
  - (a) If  $f(x)$  is not continuous, then it is not a polynomial.
  - (b) If  $f(x)$  is continuous, then it is a polynomial.
  - (c) If  $f(x)$  is not a polynomial, then it is not continuous.
  
4. **True or False:** You were once exactly 3 feet tall.
  
5. **True or False:** At some time since you were born your weight in pounds equaled your height in inches.

6. **True or False:** Along the Equator, there are two diametrically opposite sites that have exactly the same temperature at the same time.
7. Suppose that during half-time at a basketball game the score of the home team was 36 points. **True or False:** There had to be at least one moment in the first half when the home team had exactly 25 points.
8. At what point on the interval  $[-7, 2]$  does the function  $f(x) = \frac{3e^x}{4e^x - 4}$  have a discontinuity?
- (a)  $x = 0$
  - (b)  $x = 1$
  - (c)  $x = 3$
  - (d)  $x = 4$
  - (e) There is no discontinuity on this interval.
9. For what value of the constant  $c$  is the function  $f(x)$  continuous, if

$$f(x) = \begin{cases} cx + 9 & \text{if } x \in (-\infty, 5] \\ cx^2 - 9 & \text{if } x \in (5, \infty) \end{cases}$$

- (a)  $c = -\frac{9}{5}$
- (b)  $c = \frac{9}{10}$
- (c)  $c = \frac{9}{25}$
- (d) This is not possible.