

# Classroom Voting Questions: Calculus I

## 4.1 Using First and Second Derivatives

1. **True or False:** If  $f''(a) = 0$ , then  $f$  has an inflection point at  $a$ .
2. **True or False:** A local maximum of  $f$  only occurs at a point where  $f'(x) = 0$ .
3. **True or False:** If  $x = p$  is not a local minimum or maximum of  $f$ , then  $x = p$  is not a critical point of  $f$ .
4. **True or False:** If  $f'(x)$  is continuous and  $f(x)$  has no critical points, then  $f$  is everywhere increasing or everywhere decreasing.
5. **True or False:** If  $f'(x) \geq 0$  for all  $x$ , then  $f(a) \leq f(b)$  whenever  $a \leq b$ .
6. Imagine that you are skydiving. The graph of your speed as a function of time from the time you jumped out of the plane to the time you achieved terminal velocity is
  - (a) increasing and concave up
  - (b) decreasing and concave up
  - (c) increasing and concave down
  - (d) decreasing and concave down
7. Water is being poured into a “Dixie cup” (a standard cup that is smaller at the bottom than at the top). The height of the water in the cup is a function of the volume of water in the cup. The graph of this function is
  - (a) increasing and concave up
  - (b) increasing and concave down
  - (c) a straight line with positive slope.