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.

   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

2. **True or False:** A local maximum of f only occurs at a point where $f'(x) = 0$.

   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

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.

   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

4. **True or False:** If $f'(x)$ is continuous and $f(x)$ has no critical points, then f is everywhere increasing or everywhere decreasing.

   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

5. **True or False:** If $f'(x) \geq 0$ for all x, then $f(a) \leq f(b)$ whenever $a \leq b$.

(a) True, and I am very confident

(b) True, but I am not very confident

(c) False, but I am not very confident

(d) False, and I am very confident

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.