4.2 Optimization

1. **True or False:** If $f(x)$ is continuous on a closed interval, then it is enough to look at the points where $f'(x) = 0$ in order to find its global maxima and minima.

   (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 function defined on all points of a closed interval always has a global maximum and a global minimum.

   (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. Let $f$ be a continuous function on the closed interval $0 \leq x \leq 1$. There exists a positive number $A$ so that the graph of $f$ can be drawn inside the rectangle $0 \leq x \leq 1, -A \leq y \leq A$.

   The above statement is:

   (a) Always true.
   (b) Sometimes true.
   (c) Not enough information.

4. Let $f(x) = x^2$. **True or False:** $f$ has an upper bound on the interval $(0, 2)$.

   (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. Let \( f(x) = x^2 \). **True or False:** \( f \) has a global maximum on the interval \((0, 2)\).

   (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. Let \( f(x) = x^2 \). **True or False:** \( f \) has a global minimum on the interval \((0, 2)\).

   (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

7. Let \( f(x) = x^2 \). **True or False:** \( f \) has a global minimum on any interval \([a, b]\).

   (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

8. Consider \( f(x) = -3x^2 + 12x + 7 \) on the interval \(-2 \leq x \leq 4\). Where does this function have its global maximum value?

   (a) \( x = -2 \)
   (b) \( x = 0 \)
   (c) \( x = 2 \)
   (d) \( x = 4 \)

9. Consider \( f(x) = -3x^2 + 12x + 7 \) on the interval \(-2 \leq x \leq 4\). Where does this function have its global minimum value?

   (a) \( x = -2 \)
   (b) \( x = 0 \)
   (c) \( x = 2 \)
   (d) \( x = 4 \)