

Name: _____

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Circle one: Faudree (F01) | Bueler (F02) | VanSpronsen (UX1)

10 points possible. **No aids (internet, other students, book, calculator, etc.) are permitted.**You do not need to simplify final answers, but **answers without supporting work will lose points for completeness and effort.**

1. **[3 points]** Find the absolute maximum and absolute minimum values of f on the given interval. State the answer as points; give both the x - and y -coordinates of the extrema.

$$f(x) = 1 + 12x - x^3, \quad [0, 3]$$

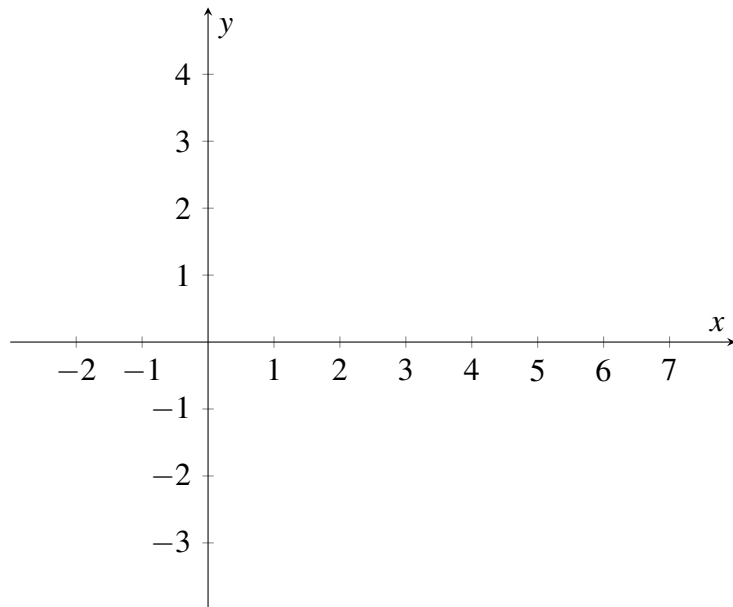
2. **[2 points]** Consider the function $g(t) = te^{-t^2}$.

a. Find all of the critical numbers.

b. Find the x -coordinate all of the inflection points.

3. [3 points] Sketch a graph that satisfies all of the conditions:

- domain $f = (-\infty, \infty)$, $f(0) = 0$,
- $f'(3) = 0$, $f'(x) < 0$ when $x < 3$,
- $f'(x) > 0$ when $x > 3$,
- $f''(1) = 0$, $f''(5) = 0$,
- $f''(x) < 0$ when $x < 1$ or $x > 5$,
- $f''(x) > 0$ for $1 < x < 5$



4. [2 points] Consider the function $f(x) = x \ln x$.

a. What is the domain of f ?

b. Find the intervals of increase and decrease