CHEM 3PC3

Quiz #2

September 16, 2025

Name: _____

Student Number: _____

SUBMISSION INSTRUCTIONS — READ CAREFULLY

To receive full credit, you must follow these steps:

1. Answer all 6 questions.
2. Write your solutions on new, separate pages. Do not write your solutions in the margins of this paper.
3. Staple your solution pages to this quiz template. This cover page must be the first page of your submission.
4. At the top of each solution page, clearly write the corresponding question number (e.g., **"Question 5"**). If you use more than one page for a question, write the question number on each page (e.g., **"Question 5 (Page 1 of 2)"**).
5. **If you cannot solve a question, still attach a page with the question number and write "Blank" or "No Answer"** to indicate you attempted it.
6. **If you are unsure of a complete answer, still attempt the question:** attach a page with the question number and write down any relevant thoughts, formulas, or initial steps. Partial credit may be awarded for demonstrated effort and correct reasoning, whereas a blank answer will receive no credit.
7. Show all your work clearly and legibly. Unorganized or illegible work may not receive credit.

1 Problems

1. Using the definition of the derivative of a function f at a point x

$$\lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

If $f(x) = \sqrt{x}$, find the derivative of f with respect to x. State the domain of the function and its derivative.

2. Using the power rule (derivative of a polynomial in the course notes). Differentiate with respect to x the following functions:
a) $f(x) = \frac{1}{x^3}$
b) $y = \sqrt[5]{x^2}$

3. Calculate:
$$\frac{d}{dx}(x^{10} + 12x^5 - 4x^4 + 10x^3 - 6x + 5) = f'(x)$$
and evaluate $f'(-1)$.

4. If $f(x) = e^x - x$, find f' and f'', where it respectively means first and second order derivative of f with respect to x. **TIP:** Use the derivative of a sum.

5. Differentiate the function $f(t) = \sqrt{t^3}(a + bt^2)$, with respect to t, consider a and b constants. **TIP:** Use the product rule.

6. Find $f'(x)$ and $f''(x)$, where it respectively means first and second order derivative of f with respect to x, of:

   a) $f(x) = \frac{x^2}{1+2x}$

   b) $f(x) = \frac{x}{x^2-1}$