

Calculus Practice I, Fall 2023

Here is an opportunity for you to maintain your calculus skills over the summer. If you complete these problems, digitize your work, and submit your work to Canvas, I will send you my solutions. If you need some help with these questions, email me with your questions (willisb@unk.edu)

Completing this work is optional, and it does not enter into your class grade in any way—this work is not a bonus, extra credit, or anything like that.

1. Find an equation of the tangent line to the curve $y = \sqrt{x^2 + 1}$ at the point $(x = 1, y = \sqrt{2})$.

2. Find each antiderivative.

(a) $\int x^2 - x - 2 \, dx$

(b) $\int (x - 1)(x + 2) \, dx$

(c) $\int \frac{1+x^2}{x^2} \, dx$

3. Find each definite integral.

(a) $\int_1^2 x^2 - x - 2 \, dx$

(b) $\int_1^2 (x - 1)(x + 2) \, dx$

(c) $\int_1^4 \frac{1+x^2}{x^2} \, dx$

4. For each function F , find the solution set of $F'(x) = 0$.

(a) $F(x) = x^2 + x + 3$

(b) $F(x) = (x - 3)(x^2 + 3)$

(c) $F(x) = 2x + \frac{x}{x-2}$

(d) $F(x) = \cos(x) \sin(x)$

5. Find the value of each limit.

(a) $\lim_{x \rightarrow 4} \frac{\cos(x) + 1}{x - 3}$

(b) $\lim_{x \rightarrow 4} \frac{x^2 - 2x - 3}{x - 3}$

(c) $\lim_{x \rightarrow \infty} \frac{5x^2 + x + 1}{7x^2 + 107}$