

Math 181 Honors Exam 1 Version B

1. Find the domain of  $f(x) = \sqrt{x^2 - 1}$ .

2. Evaluate the sum  $\sum_{k=1}^4 \frac{k^2}{5}$ .

3. Compute in any way  $\lim_{x \rightarrow \infty} \frac{3x + 17}{x}$ .

4. Compute in any way  $\lim_{x \rightarrow 2} \frac{x^2}{x - 3}$ .

Math 181 Honors Exam 1 Version B

5. Convert the repeating decimal  $1.\overline{7}$  to a fraction.

6. Use induction to show  $1 + 3 + 5 + \cdots + (2n - 1) = n^2$  for every positive integer  $n$ .

Math 181 Honors Exam 1 Version B

7. Solve the inequality  $|2x - 1| \geq 5$ .

8. Use  $\delta$ - $\epsilon$  definition of limit to verify  $\lim_{x \rightarrow 3} x^2 = 9$ .

Math 181 Honors Exam 1 Version B

**9.** Solve the inequality  $x^2 + 3x > 10$ .

**10.** Use the method of increments to find  $\frac{dy}{dx}$  when  $y = 3\sqrt{x}$ .

Math 181 Honors Exam 1 Version B

11. Work only one of the following problems.

- (i) Suppose  $y = uv$  where  $u$  and  $v$  depend on the variable  $x$ . Use the method of increments to verify that

$$\frac{dy}{dx} = \frac{du}{dx}v + u\frac{dv}{dx}.$$

- (ii) Suppose

$$\lim_{x \rightarrow 1} f(x) = 2 \quad \text{and} \quad \lim_{x \rightarrow 1} g(x) = 3.$$

Use the  $\delta$ - $\epsilon$  definition of limit to verify  $\lim_{x \rightarrow 1} (f(x) + g(x)) = 5$ .