MATH-140
Spring 2026
Exam 1
January 28, 2026

Name: _____

Pledge: _____

Each question topic and point value is recorded in the tables below. This exam must be completed within the 50 minutes allotted during class. You must work without any external resources (no notes or calculator). You must show appropriate work to justify your answers.

Scoring Table

Question	Points	Score
1	8	
2	8	
3	6	
4	12	
5	8	
6	8	
Total:	50	

Topics Table

Question	Topic
1	Polynomials and Rational Functions
2	Logs and Exponents
3	Trig and Inverse Trig
4	Evaluating Limits Graphically
5	Evaluating Limits Analytically
6	Continuity

1. Answer each question.

   (a) (4 points) Complete the square and write $p(x)$ in vertex form. Then state the vertex.

   $$p(x) = x^2 - 8x + 1.$$

   (b) (4 points) Simplify the rational function for $x \neq 3$ and state the domain of the original function:

   $$r(x) = \frac{x^2 - 9}{x - 3}.$$

2. Solve the following equations for x.

   (a) (4 points) $2\ln(x) - \ln(3x + 1) = 0$

   (b) (4 points) $e^{2x} - 7e^x + 10 = 0$

3. Evaluate each expression exactly.

   (a) (3 points)

$$\sin\left(\frac{\pi}{6}\right) + \cos\left(\frac{\pi}{3}\right) + \tan\left(\frac{\pi}{4}\right).$$

   (b) (3 points)

$$\tan\left(\arcsin\left(\frac{2}{5}\right)\right).$$

4. (12 points) Consider the function shown in the graph below. Evaluate each expression.
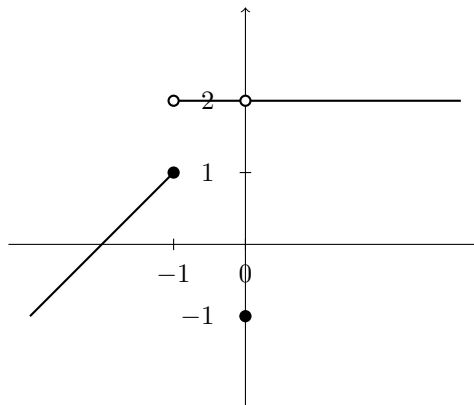
(a) $\lim_{x \to 0^-} f(x)$

(b) $\lim_{x \to 0^+} f(x)$

(c) $\lim_{x \to 0} f(x)$

(d) $f(0)$

(e) $\lim_{x \to -1} f(x)$

(f) $f(-1)$

5. Evaluate each limit.

   (a) (4 points)
$$\lim_{x \to 0} \frac{\sin(3x)}{x}.$$

   (b) (4 points)
$$\lim_{x \to -2} \frac{x^2 + 4x + 4}{x + 2}.$$

6. Let

$$F(x) = \begin{cases} x + 3, & x < 1, \\ c, & x = 1, \\ 5 - x, & x > 1. \end{cases}$$

(a) (3 points) Find the value of c that makes F continuous at $x = 1$.

(b) (3 points) Give one value of c such that F is discontinuous at $x = 1$.

(c) (2 points) Briefly justify your answers to parts (a) and (b) using the definition of continuity.