

Name:

Table:

No electronic devices (phones, calculators, computers, etc.) are allowed during the exam.

Each problem is worth one point.

Problem 1

Determine the inverse of the function $f(x) = \sqrt[3]{x-1} + 2$.

Problem 2

Simplify the following expression: $(x+y)^5$.

Problem 3

Express $\log_3(7)$ as a quantity where all logarithms have base 10.

Problem 4

Simplify the following expression: $\ln(e^{3x+1} \cdot (e^x)^2) - e^{\ln(4x+2)} + 1$.

Problem 5

Determine the following limit: $\lim_{x \rightarrow 3} (x^3 + 2x - 1)$.

Problem 6

Determine the following limit: $\lim_{x \rightarrow 0} \frac{(7 + 2x)^2 - 49}{x}$.

Problem 7

Let $f(x)$ be the function described below. What is $\lim_{x \rightarrow 1^+} f(x)$?

$$f(x) = \begin{cases} x^2 & \text{if } x < -1 \\ \sqrt{2-x} & \text{if } -1 \leq x \leq 1 \\ x^3 - 3 & \text{if } 1 < x \end{cases}$$

Problem 8

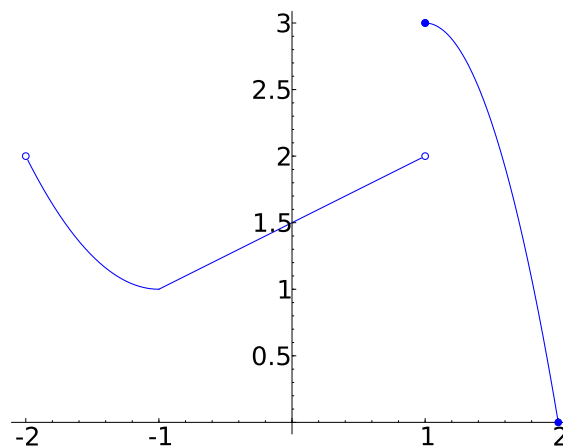
Suppose the position of a particle at time t is given by the function

$$f(t) = \frac{t^2 + 2t}{t^2 - 7t + 11}.$$

What is the average velocity of the particle over the time interval $[2, 5]$?

Problem 9

Consider the function $f(x)$ whose graph $y = f(x)$ is presented below.



- (a) What is the domain of this function?
- (b) What is the range of this function?
- (c) For what values of a in the domain of the function is the limit $\lim_{x \rightarrow a} f(x)$ undefined?

Problem 10

Let $f(x) = 2x + 3$. What value of $\delta > 0$ guarantees that $|f(x) - 7| < 1/100$ whenever $0 < |x - 2| < \delta$? For full credit, you must show that your choice of δ does in fact guarantee that $|f(x) - 7| < 1/100$.