

Show all work clearly and in order (on this sheet or an attached sheet) and circle your final answers.

Justify your answers algebraically whenever possible. Work without justification may not receive credit.

You have 25 minutes to take this 10 point quiz.

1. (3 points) What is the largest possible domain (in \mathbb{R}) for a function defined by formula $f(x) = \frac{\sin(x)}{x^2 - 4}$?

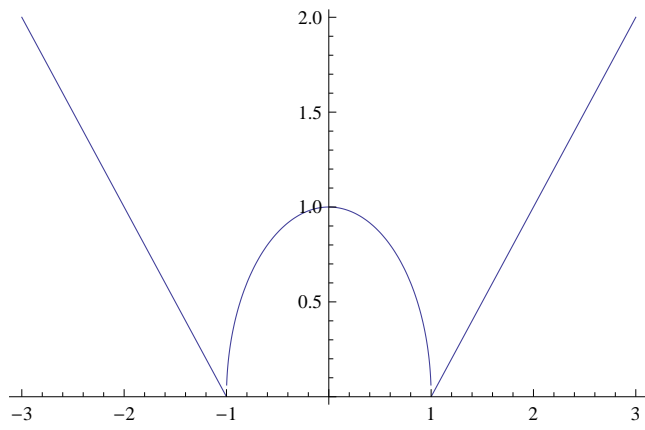
Solution: $\mathbb{R} \setminus \{2, -2\}$

2. (3 points) Compute the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = 3x^3$ and simplify.

Solution: Compute

$$\begin{aligned} \frac{f(x+h) - f(x)}{h} &= \frac{3(x+h)^3 - 3x^3}{h} \\ &= \frac{3x^3 + 9x^2h + 9xh^2 + 3h^3 - 3x^3}{h} \\ &= \frac{9x^2h + 9xh^2 + 3h^3}{h} \\ &= 9x^2 + 9xh + 3h^2. \end{aligned}$$

3. (4 points) Find a formula for the function $g: [-3, 3] \rightarrow [0, \infty)$ whose graph is the given curve (comprised of two straight line segments and a semicircle).



Solution:

$$g(x) = \begin{cases} -x - 1 & ; -1 \leq x \leq -1 \\ \sqrt{1 - x^2} & ; -1 < x < 1 \\ x - 1 & ; 1 \leq x \leq 3. \end{cases}$$