Solutions

MAA 2311 - Calculus I
Quiz # 1, August 31, 2023

(3 points)

Problem 1 *Find the domain for each the following functions. Specify the domain using interval notation or inequalities.*

a) (2)

$$f(x) = ln(x^2 + 1)$$

- Requirement: $x^2+1 \geq 0$. (2 points)
  But this holds for any x in $(-\infty, \infty)$
  Therefore the domain of f is $(-\infty, \infty)$: interval notation.
  or $-\infty < x < \infty$: inequalities.

b)

$$g(x) = \frac{2|x| + x}{x - 3}$$ (1)

The only restriction is $x \neq 3$.
Domain of g is $(-\infty, 3) \cup (3, \infty)$

Problem 2 : *Solve for x* (4 points)

~~a)~~

Start Here

$$2ln(x) - ln(3 - x) = ln(\frac{1}{2}) + ln(8)$$ (4)

$\ln(x^2) - \ln(3-x) = \ln(\frac{1}{2}) + \ln(8)$ (*)

$\ln\left(\frac{x^2}{3-x}\right) = \ln(\frac{1}{2}) + \ln(8) = \ln(4)$, $\log(x) - \log(y) = \log(\frac{x}{y})$ (1 point)

$\ln\left(\frac{x^2}{3-x}\right) = \ln(4)$

$\frac{x^2}{3-x} = 4$, Apply ln being one-to-one. (1 point), or take the inverse on both sides.

$\frac{x^2}{3-x} - 4 = 0$

(*) $\ln(\frac{1}{2}) + \ln(8)$
$= \ln(\frac{1}{2} \cdot 8)$
$= \ln(4)$ (1 point)

$\frac{x^2 - 4(3-x)}{3-x} = 0$

$\frac{x^2 - 12 + 4x}{3-x} = 0$

$x^2 + 4x - 12 = 0$

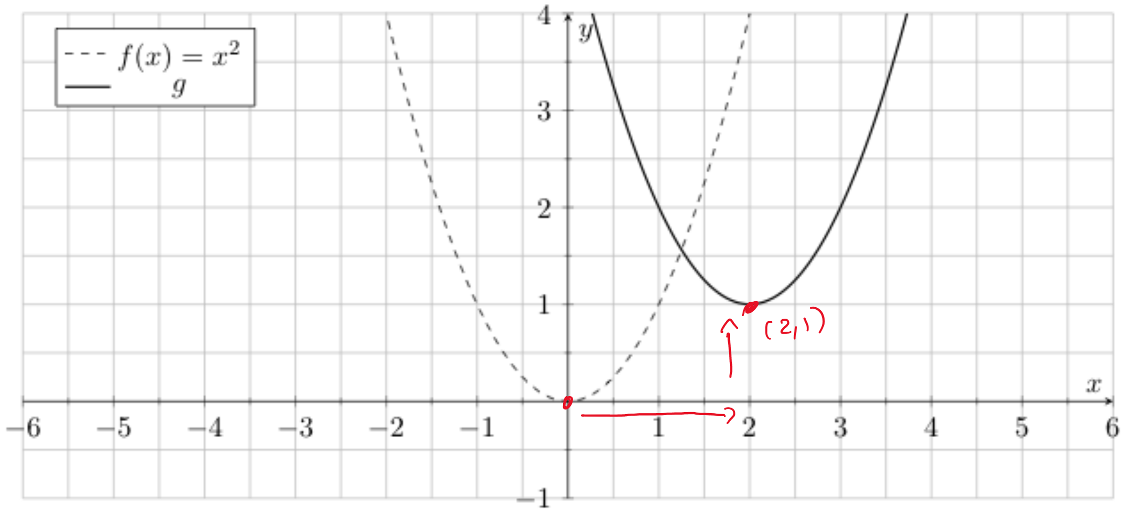
$(x+6)(x-2) = 0$

$x = -6$, $x = 2$

- Determine that $x = 2$ is the only solution because $\ln(x)$ is not defined for $x = -6$.

Problem 3 : (3 points)

Consider the graphs of the two functions f and g. Where g is obtained by transforming f.



a) *Which of the following it the correct definition for g? Choose the correct solution:*

i) $g(x) = x^2 + 4x + 5$

ii) $g(x) = x^2 - 4x + 5$

iii) $g(x) = x^2 + 4x - 5$

iv) $g(x) = x^2 - 4x + 3$

$(x-2)^2 + 1 = x^2 - 4x + 4 + 1$ (2)

shift 2 units to the right

shift one unit upward.

b) *What is the range of g? Choose the correct solution:*

i) $[1, \infty)$

ii) $(-\infty, \infty)$

iii) $(0, \infty)$

iv) $(1, \infty)$

The function g can only achieve values greater than or equal to 1. (1)