Problem 1: Try on your own, write down any questions, then look for answers

Consider the following graph of a function $f$:

a) What is the domain of the function $f$?

b) What is the range of the function $f$?

c) What is the $y$-intercept of the graph?

d) What is $f(-1)$?

e) Solve the equation $f(x) = 2$.

f) Is the function $f$ odd, even, or neither?

g) List the intervals where $f$ is increasing.

h) List the intervals where $f$ is decreasing.
i) Is the function $f$ invertible?

j) Give an interval where $f$ is one-to-one.
Problem 2: Reflect on the problem after finishing: why did I ask it?
Draw a graph below of a function $f$ with the following properties.

a) The domain of $f$ is $[-4,3)$.

b) The range of $f$ is $[-3,3)$.

c) The $y$-intercept of the graph of $f$ is $(0,0)$.

d) $f(-1) = 2$

e) $f$ is increasing on the interval $(-3,-2)$.

f) $f$ is decreasing on the interval $(0,1)$.

g) $f$ is one-to-one on the interval $(2,3)$. 
Problem 3: Use previous parts of the problem to help
Determine the domain of the function $f$. Recall that an expression is undefined if its denominator is 0, it has a negative underneath an even root, or the argument of a logarithm is non-positive.

a) $f(x) = \frac{x}{x+2}$

b) $f(x) = \sqrt{1-x}$

c) $f(x) = \log(7x)$

d) $f(x) = \frac{2}{x^2-4}$

e) $f(x) = \frac{\sqrt{1-x}}{x+2}$

f) $f(x) = \frac{x}{\sqrt{1-x}}$

g) $f(x) = \frac{1}{\log(7x)}$
Problem 4: Use Desmos to find the answers and then work in groups to justify your answers without graphing.

Evaluate the following:

a) \( \ln(e^{-5}) \)

b) \( e^{\ln(-5)} \)

c) \( \sqrt{4^2} \)

d) \( \sqrt{(-4)^2} \)

Are any of the results surprising? Can you explain them? Explanation is a key skill we want you to learn in Calc 1.
Problem 5: Explain what you found to a partner and come to an agreement

Recall the following logarithm rules:

1. $\log_b(xy) = \log_b(x) + \log_b(y)$
2. $\log_b(x/y) = \log_b(x) - \log_b(y)$
3. $\log_b(x^p) = p \log_b(x)$

Combine the following logarithms into one logarithm with coefficient 1.

$$\log(x) - \frac{1}{2} \log(y) + 3 \log(z)$$

Expand the following logarithm as much as possible. Try to have the inputs to the logarithms be as simple as possible.

$$\log \left( \frac{x^2 \sqrt{y}}{z^3} \right)$$