Problem 1: 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) \( \sqrt{(-4)^2} \)

e) \( \sin(\arcsin(3/4)) \)

f) \( \sin(\arcsin(4/3)) \)

g) \( \arcsin(\sin(0)) \)

h) \( \arcsin(\sin(\pi)) \)

Are any of the results surprising? Can you explain them? Explanation is a key skill we want you to learn in Calc 1.
Problem 2: 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.

\[
\log \left( \frac{x^2 \sqrt{y}}{z^3} \right)
\]
Problem 3: Try on your own, write down any questions, then look for answers

Consider the following graph of a function $f$:

![Graph of 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 4: 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 5: 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) $f(x) = \frac{1}{\log(7x)}$