Use the given function f to:[1]

$$f(x) = -2\ln(x+1)$$

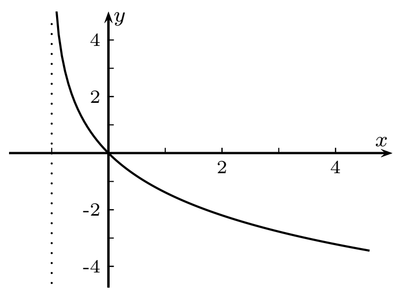
(a) *Find the domain of f.*

Since the input to any logarithmic function must be positive, we need

$$x + 1 > 0$$
$$x > -1$$

so in set builder notation, we write $\{x|x > -1\}$. Using interval notation, we write $(-1, \infty)$.

(b) *Graph f.*



(c) *From the graph, determine the range and any asymptotes of f.*

The range of f is all real numbers, *i.e.* $(-\infty,\infty)$. There is a vertical asymptote at $x = -1$.

(d) *Find f^{-1}, the inverse of f.*

We write our function as

$$y = -2\ln(x+1)$$

and solve for x:

$$-\frac{1}{2}y = -\frac{1}{2} \cdot -2\ln(x+1)$$
$$-\frac{1}{2}y = \ln(x+1)$$

From the definition of logarithm (or "exponentiating both sides")

$$e^{-\frac{1}{2}y} = e^{\ln(x+1)}$$
$$e^{-\frac{1}{2}y} = x + 1$$
$$e^{-\frac{1}{2}y} - 1 = x$$

We switch the variables and write the inverse of f:

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

(e) *Find the domain and range of f^{-1}.*

Since the range of f is $(-\infty,\infty)$, the domain of f^{-1} is $(-\infty,\infty)$. Since the domain of f is $(-1, \infty)$, the range of f^{-1} is $(-1, \infty)$.

[1] Sullivan, *Precalculus: Enhanced with Graphing Utilities*, p. 298, #76.

(f) *Graph* f^{-1}.