MTH 161, Quiz #6, Spring 2021 Name KEY

Instructions: Show all work. Use exact answers unless specifically asked to round. Answer all parts of each question.

1. Sketch the graph of $f(x) = -e^{x/2} + 2$. Then find the inverse of $f(x)$ and sketch that function on the same graph.

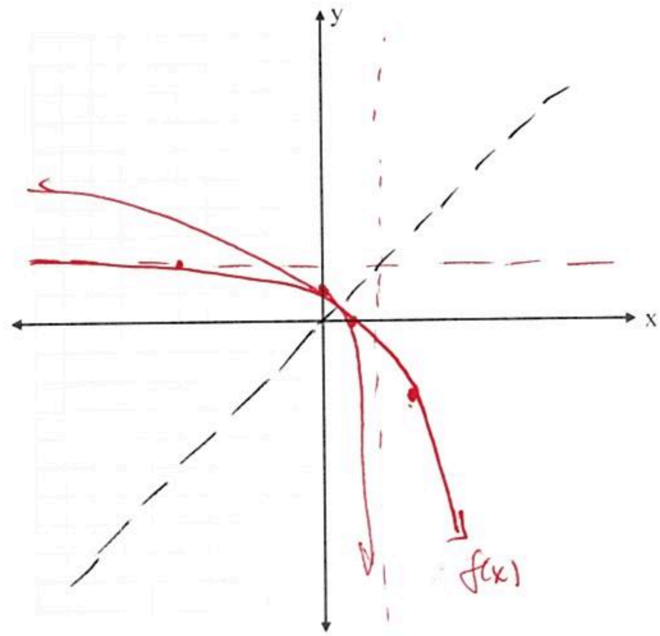
$x = -e^{y/2} + 2$

$x - 2 = -e^{y/2}$

$2 - x = e^{y/2}$

$\ln(2-x) = y/2$

$2\ln(2-x) = y = f^{-1}(x)$



2. State the domain and range of the functions:

a. $f(x) = \left(\frac{1}{2}\right)^{x-1} - 2$

D: $(-\infty, \infty)$

R: $(-2, \infty)$

b. $g(x) = \log\left(\frac{x+1}{x-5}\right)$

D: $x \neq 5$, $x > -1$ $\quad (-\infty, -1) \cup (5, \infty)$

R: $(-\infty, 0) \cup (0, \infty)$

3. Expand the expression $\log\left(\frac{\sqrt[4]{x}y^4}{z^5}\right)$ as much as possible.

$\log(\sqrt[4]{x}) + \log(y^4) - \log(z^5)$

$\frac{1}{4}\log(x) + 4\log(y) - 5\log(z)$

4. Combine the expression $\frac{1}{2}[5\ln(x+6) - \ln x - \ln(x^2 - 25)]$ into a single logarithmic expression.

$\frac{1}{2}[\ln(x+6)^5 - \ln x - \ln(x^2-25)]$

$\frac{1}{2}\left[\ln \frac{(x+6)^5}{x(x^2-25)}\right] = \ln\sqrt{\frac{(x+6)^5}{x(x^2-25)}}$