

Math 150 Week-in-Review 6 Problem Set

(Parts of Problems 6 and 8 were taken from *Precalculus: Functions and Graphs* by Swokowski/Cole)

1. Find all intercepts and asymptotes for the following rational functions.

(a) $r(x) = \frac{3x^2 - 12}{4x^2 + 4x - 3}$

(b) $r(x) = \frac{x^3 + 2x^2 - 8x}{2x^2 - 8x - 10}$

2. Sketch the graph of the rational function: $r(x) = \frac{(x+4)(x-2)^2}{(x-3)(x+1)(x+5)^2}$

3. Sketch graphs for the following exponential and logarithmic functions by using transformations. Find the domain, range, and asymptotes for each.

(a) $f(x) = -\left(\frac{1}{4}\right)^{x+1} + 2$

(b) $f(x) = \log_3(-x) - 1$

4. Find the domain of the logarithmic function $f(x) = \log_2(x^2 - 9x + 18)$.

5. Use the Laws of Logarithms to expand the following expressions as far as possible.

(a) $\ln\left(\frac{3x^5(x+2)^2}{\sqrt[4]{y}}\right)$

(b) $(\log(4x + 8y))^2$

6. Use the Laws of Logarithms to combine the following expressions and write as a single logarithm when possible.

(a) $\log(x-7) - \frac{1}{2}\log y + 5\log z$

(b) $\frac{\ln x(2\ln x - 4\ln(\frac{1}{y}) - 3\ln(xy))}{4\ln x + \ln y}$

7. Evaluate the following logarithmic expressions.

(a) $\log_3 \sqrt{27}$

(b) $\log 10000 + \ln e^{-5} + 4^{\log_4 7}$

(c) $\log_4 5 - \log_4 80$

(d) $\log_2 144 + \log_2 9 - \log_2 81$

8. Solve the following equations for x .

(a) $\log_x 8 = \frac{3}{4}$

(b) $6^{3x-7} = 2$

(c) $\ln(x+1) - \ln 4 = 3$

(d) $2e^{-20x} = 3$

(e) $\log_3(x - 6) + \log_3(x + 2) = 2$

(f) $4^{2x+3} = 5^{x-2}$

(g) $\log(x - 4) - \log(3x - 10) = \log\left(\frac{1}{x}\right)$

(h) $\log_3 x - \log_9(x + 42) = 0$