

# MTH30

## Review sheet for Midterm 2

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1. For each of the following rational functions  $f$

A.  $f(x) = \frac{x+1}{x-2}$     B.  $f(x) = \frac{x^2+2x-3}{x^2-2x-3}$     C.  $f(x) = \frac{x^2-9}{x^2-x-2}$     D.  $f(x) = \frac{2-x}{x^2+x-2}$   
E.  $f(x) = \frac{x^2}{x^2+1}$

- (a) Factor numerator and denominator and simplify if possible.
- (b) Find the  $x$  and  $y$  intercepts of the graph of  $y = f(x)$  if they exist.
- (c) Find any vertical or horizontal asymptotes.
- (d) Use the above information to sketch a graph of  $y = f(x)$ .

2. For the following functions, find  $f(-3)$ ,  $f(-2)$ ,  $f(-1)$ ,  $f(0)$ ,  $f(1)$ ,  $f(2)$ ,  $f(3)$ . Then plot the points you got and sketch their graph.

A.  $f(x) = 2^x$     B.  $f(x) = 3^x$     C.  $f(x) = \left(\frac{1}{2}\right)^x$     D.  $f(x) = 2^{-x}$

3. Convert the following from exponential form to logarithmic form.

A.  $e^x = 5$ .    B.  $4^{x+3} = 7$     C.  $\left(\frac{1}{3}\right)^{2y+1} = x-3$     D.  $10^{x+2} = 14$ .

4. Convert the following from exponential form to logarithmic form.

A.  $\ln y = 7$ .    B.  $\log_5(y+3) = x+7$     C.  $\log_{\frac{1}{3}}(2y+1) = 5$     D.  $\log(x+2) = 12$ .

5. Expand

- (a)  $\log_7(x^4y^3)$
- (b)  $\log_3 \frac{x^4y^3}{z^2w^8}$
- (c)  $\log(x^4y^3)^5$
- (d)  $\log \sqrt[4]{\frac{10x^2y^3}{5z}}$

6. Condense

- (a)  $3 \log x + 7 \log y$
- (b)  $4 \log_4 x - 5 \log_4 y + \log_4 z - 3 \log_4 w$
- (c)  $\frac{1}{2} \ln x - \frac{2}{6} \ln y + \frac{3}{4} \ln z$
- (d)  $\frac{1}{5} (2 \log x - \frac{1}{2} \log y + \frac{2}{3} \log z)$

7. Evaluate the following expressions. Give exact values whenever possible:

- (a)  $\log_2 \frac{1}{64}$
- (b)  $\log_9 \frac{\sqrt{3}}{3}$
- (c)  $\log_b x^3y$ , given that  $\log_b x = 2$  and  $\log_b y = 36$
- (d)  $e^{x-y}$  given that  $e^x = 3$  and  $e^y = 4$

(e)  $\log_a \left( \frac{x}{y} \right)$  given that  $\log_a(x) = 12$  and  $\log_a(y) = 4$

(f)  $\ln e^{\sqrt{2}}$

(g)  $\log 1000$

(h)  $\log_7 31$ , rounded to the nearest hundredth

(i)  $e^{\ln 5}$

(j)  $\log_7 7^{124}$

8. Write the following logarithms in the indicated base. Simplify what you can.

(a)  $\log_5 7$ , in base 7.

(b)  $\log_8 4$ , in base 2.

(c)  $\log_6 10$ , in base  $e$ .

9. Solve the following equations. If the answer is not an exact numbers, leave it expressed as a logarithm.

(a)  $7^{x+2} = 49$

(b)  $4^{x+3} = 8^{2x-4}$

(c)  $e^x = 2$

(d)  $3^{x+5} = 9 \cdot 3^{x+2}$

(e)  $\log_2 x - \log_2(x-1) = 1$

(f)  $\log_3 x - 2 = \log_3 4$

(g)  $\log_5(x+2) + \log_5(x+3) = \log_5(1-x)$

(h)  $4 + \log_2(9x) = 2$