Name: _____

MATH 101
Summer 2022
HW 11: Due 06/15

Problem 1. (10pt) Write the following exponential functions in the form $y = Ab^x$:

(a) $y = -3(2^{3x})$

(b) $f(x) = 4\left(\dfrac{5}{7}\right)^{-x}$

(c) $g(x) = -6(5^{1-3x})$

(d) $h(x) = 9\left(\dfrac{3}{2}\right)^{2x-1}$

Problem 2. (10pt) Write the following exponential functions in the form $y = Ab^{-x}$:

(a) $y = 6(2^x)$

(b) $f(x) = -7\left(\dfrac{1}{3}\right)^x$

(c) $g(x) = 5\left(\dfrac{1}{6}\right)^{2x}$

(d) $h(x) = 3^{3x+1}$

Problem 3. (10pt) Find an integer n so that each of the following logarithms are between n and $n + 1$, i.e. estimate the logarithm without the use of a calculator. Be sure to show all your work.

(a) $\log_2(11)$

(b) $\log_3(187)$

(c) $\log_{1/2}(5)$

(d) $\log_5\left(\frac{1}{20}\right)$

Problem 4. (10pt) For each of the following, either express the given exponential equation in terms of logarithms or express the given logarithmic equation in terms of exponentials:

(a) $5^x = 9$

(b) $\log_3(x) = 4$

(c) $2^3 = x$

(d) $\log_7(2) = x$

Problem 5. (10pt) Showing all your work, compute the following exactly:

(a) $\log_2(64)$

(b) $\log_3\left(\dfrac{1}{27}\right)$

(c) $\ln(1)$

(d) $\log_{2/3}\left(\frac{3}{2}\right)$

(e) $\log_8(8)$

Problem 6. (10pt) For each of the following, express the given logarithm in terms of $\log_b$ for the given base b:

(a) $\log_5(25)$, $b = 2$

(b) $\log_7(64)$, $b = 8$

(c) $\log_3(10)$, $b = e$

(d) $\log_{20}(6)$, $b = 6$

Problem 7. (10pt) Express each of the following logarithms in terms of $\log x$, $\log y$, $\log z$, and a constant term:

(a) $\log_2(x^2 y)$

(b) $\log_7\left(\dfrac{xy^2}{z^3}\right)$

(c) $\ln\left(\dfrac{xz^{-1}}{\sqrt[3]{y}}\right)$

(d) $\log_5(25x\sqrt{y})$

Problem 8. (10pt) Express each of the following logarithms in terms of a single logarithm involving no negative powers:

(a) $\log_2(x) - 5\log_2(y)$

(b) $-\dfrac{1}{2}\left(6\log_3(x) - \log_3(y)\right)$

(c) $5\ln(x^2) - 2\ln\left(\dfrac{1}{y}\right)$

(d) $\log_6(x) - 5\log_6(y) + 2$

Problem 9. (10pt) Showing all your work, solve the following equation:

$$15^x + 10 = 20$$

Problem 10. (10pt) Showing all your work, solve the following equation:

$$6(2^{3x}) - 2 = 34$$