Name: _____

MATH 101
Spring 2022
HW 3: Due 02/15

"Stop touching things."
–Mandalorian, The Mandalorian

Problem 1. (10pt) Is the following statement true or false, explain: *Any* number to the zero power is 1, i.e. $x^0 = 1$ for all real numbers x.

Problem 2. (10pt) Is the following statement true or false, explain: $\frac{1}{x^{-3}} = \frac{1}{x \cdot x \cdot x}$

Problem 3. (10pt) Is the following statement true or false, explain using words and a calculator computation: $\sqrt[3]{2}$ is the number that when cubed yields 2.

Problem 4. (10pt) Showing all your work, simplify the following as much as possible:

(a) $(x^{-2}y^5)^3$

(b) $\dfrac{x^{-3}y^4}{x^3y^5}$

(c) $x(x^5y)^2y^{-6}$

Problem 5. (10pt) Showing all your work, simplify the following as much as possible:

(a) $\left(\dfrac{x^3}{y^{-1}}\right)^{-1}$

(b) $\dfrac{(x^2y)^0x^4}{(y^3)^2}$

(c) $\dfrac{(x^{-3}y^4)^{-5}x^2y}{x^{-2}y^0}$

Problem 6. (10pt) Showing all your work, simplify the following as much as possible:

(a) $(x^7y^8)^{1/2}$

(b) $\left(\dfrac{\sqrt{x^5}}{\sqrt[3]{y^2}}\right)^4$

(c) $\dfrac{x(x^{3/2}y^{2/3})^2}{(x^{1/6}y)^{1/3}}$

Problem 7. (10pt) Showing all your work, simplify the following as much as possible:

(a) $\dfrac{(y\sqrt{x})^4}{\sqrt{y}\,x^{-3/2}}$

(b) $(\sqrt[3]{yx^2})^2(yx^2)^{1/3}$

(c) $\left(\dfrac{x^4}{y^7}\right)^{-2/3}$

Problem 8. (10pt) Showing all your work, simplify the following as much as possible:

(a) $\sqrt{72}$

(b) $\sqrt{180}$

(c) $\sqrt{500}$

Problem 9. (10pt) Showing all your work, simplify the following as much as possible:

(a) $\dfrac{\sqrt{60}}{3}$

(b) $\sqrt[3]{80}$

(c) $\sqrt[4]{2^{12} \cdot 3^3 \cdot 5^9 \cdot 7^4}$

Problem 10. (10pt) Rationalize the following fractions:

(a) $\dfrac{1}{\sqrt{5}}$

(b) $\dfrac{2}{\sqrt{3}}$

(c) $\dfrac{4}{1-\sqrt{2}}$

(d) $\dfrac{6}{3+\sqrt{6}}$

(e) $\dfrac{1}{\sqrt[3]{4}}$