Name Mine Date

Math 111: Final Review 5b

1. In chemistry, C denotes the concentration of hydrogen ions (measured in moles/liter) in a solution; $C \in (0, 1)$. The pH of a solution is calculated as:

$$pH = -\log C$$

a) A Rockstar energy drink is acidic and has a $pH = 2.53$. Find the concentration of hydrogen ions in a solution with a pH of 2.53.

$2.53 = -\log C$

$10^{-2.53} = 10^{\log C}$

$C = 10^{-2.53}$

b) Fiji water is a slightly alkaline solution and has a $pH = 7.5$. Find the concentration of hydrogen ions in a solution with a pH of 7.5.

$7.5 = -\log C$

$10^{-7.5} = C$

c) Find the inverse function for the function $pH(C)$ including the domain & range.

$pH = -\log C$

$10^{-pH} = 10^{\log C}$

$10^{-pH} = C = pH(C)$

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

Range: $(0, 1)$

d) How many times greater is the hydrogen ion concentration in a Monster energy drink with a $pH = 3.49$ than the hydrogen ion concentration in mild with a $pH = 7.33$? State the exact answer, then give the answer rounded to two places.

$3.49 = -\log C$

$C = 10^{-3.49}$

$7.33 = -\log C$

$C = 10^{-7.33}$

$$\frac{10^{-3.49}}{10^{-7.33}} = 6{,}918.31 = 10^{3.84}$$

times more acidic

2. In seismology, I is the intensity measurement of the wave energy of an earthquake; $I > 0$. The *Richter Scale measurement* of an earthquake can be approximated with:

$$R = \log I$$

a) The 1906 San Francisco earthquake had a Richter scale measure of 8.6. Find its intensity.

$10^{8.6} = 10^{\log I}$

$10^{8.6} = I = 398{,}107{,}170.6$

b) In November, 2016 there was an earthquake in Warrenton, OR that had a Richter scale measure of 3.6. Find its intensity.

$3.6 = \log I$

$10^{3.6} = I = 3{,}981.07$

c) Find the inverse function for the function $R(I)$ including the domain & range.

$10^{R} = 10^{\log I}$

$10^{R} = I = R(I)$

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

Range:

d) How many times greater is the intensity of the San Francisco Earthquake than the Warrenton one ? State the exact answer, then give the answer rounded to two places.

$$\frac{10^{8.6}}{10^{3.6}} = 100{,}000 = 10^5 \text{ times greater}$$