**MATH 100:  class discussion**

**30 Aug 2018**

**Number systems & basic algebraic operations**



Riddle of the day: *A frog is at the bottom of a 30 meter well. Each day he summons enough energy for one 3 meters leap up the well. Exhausted, he then hangs there for the rest of the day. At night, while he is asleep, he slips 2 meters backward. How many days does it take him to escape from the well?*

*Note: Assume after the first leap that his hind legs are exactly three meters up the well. His hind legs must clear the well for him to escape.*

* **If time permits play 2048. Download app on your phone.**

**I Section 1.1 of Larson**

1. What is a natural number? An integer? A rational number? An irrational number? A real number? Give several examples of each.
2. Classify (using the terminology of (a)), each of the following numbers:

-1, 0, π, ,

(c) Which is larger x or y? If x is larger than y, write x > y; if x is smaller than y, write x < y.

(i) 14, 99

(ii) 5/7, 9/5

(iii) 90000013, -1/44

(iv) 12345/12, 7654/13

(v)

(d) Find the *distance* between each of the following pairs of points on the real line:

(i) 14, 19

(ii) 19, 14

(iii) -5, 3

(iv) 0, -7/11

(v) 17.89, - 4

(vi) 8.888, 4.444

(vii) 8.888, -4.444

(vii) x, y

(viii) x – 99, x + 67

(e) What is the meaning of *absolute value*? Evaluate each of the following:

(i) |2018|

(ii) |-2018|

(iii) -|-11|

(iv) |5 – 11| – |-9| – 4

(f) Express each of the following sentences as a mathematical equation.

(i) Max is at least 18 years old.

(ii) Max’s cat is older than 8 years and younger than 13 years.

(iii) Albertine’s laptop is less than 2.5 years old.

(g) Find two solutions to each of the following equations:

(i) |x| = 5

(ii) |-y| = 5

(iii) |x – 9| = 4

(iv) |4 – 3x| = 14

(h) Simplify each of the following:

(i) -(-9)

(ii) (-4)(-11)

(iii) -(-1)(-2)(-3) + 8

(iv) -(2)(-3)(4)(-5)

**II Algebra exercises from Hall & Knight**

1. If a = 7, b = 2, c = 0, x = 5, y = 3, find the value of: (A) ab3, (B) a4by, (C) a5c5yx, (D) 1x+3y, (E) abcxy, (F) 2a + 5b + 9c, (G) 3x2 + 1, (H) , (I) 

2. If a = 2, b = 3, c = 1, p = 0, q = 4, r = 6, find the value of: (A) , (B) 3a2bc, (C) , (D) , (E) 

3. If a = 2, b = 3, c = 1, d = 0, find the numerical value of: (A) 3bcd + 5cda – 7dab + abc,

(B) 2a2 + 3b3 – 4c4, (C) a2 + b2 + c2 + d2, (D) a4 + b4 – c4

4. If a = 2, b = 1, c = 3, x = 4, y = 6, z = 0, find the value of:

(A) c2(y – x) – b2(c – a) , (B) (2a – c)(x + 2y – z), (C) ,

(D) , (E) 

5. When *x* has the values 0, 3, 6, 8, 10, find the values of x2 – 9x + 20.

6. Show that, if a = 10 and b = 7, then the following two expressions are equal:

4(a – b) + 3(a + b), 5(a + b) + 2(a – 3b)

Are these expressions equal *for all values of a and b?*

7. When x = 5, show that 4x2 + 4x – 3 is equal to 9(x + 8).

*vocabulary:* integer, natural number, rational number, absolute value, algebraic expression, terms, simple expression, compound expression, binomial expression, substitution

