

HOMEWORK 11
December 8, 2019

1. Compute; be very attentive to signs, operations. Do not make silly mistakes when copying the problem to your home work sheet. Show terse (means short) intermediate calculations.

$$(-5 - 9) \div (-2) + 7 =$$

$$(-2) \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) =$$

$$-2 \cdot (-5 - 9) - 7 \cdot 4 =$$

$$-16 \div (-8) =$$

$$-9 + 14 \div (-2) + 7 =$$

$$-16 \div 8 =$$

$$-2 \cdot (-a - 2a) + 6a =$$

$$16 \div (-8) =$$

2. Solve equations, move Xs to the left please.

$$3x - 2(7x - 9) = -59$$

$$-3a = -14$$

$$-\frac{5}{9}x = -1\frac{1}{3}$$

3. Perform calculations in the base 4:

a)

$$\begin{array}{r} 333 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 1111 \\ - 222 \\ \hline \end{array}$$

$$\begin{array}{r} 3231 \\ - 1321 \\ \hline \end{array}$$

- b) Write a formula, instruction, or algorithm on how to translate base 4 number **abcd** to base 10 number, where a, b, c, d can be 0, 1, 2, or 3.

4. Perform calculations in the base 13:

$$\begin{array}{r} 9999 \\ + 2222 \\ \hline \end{array}$$

$$\begin{array}{r} 1A2B3C \\ + 999999 \\ \hline \end{array}$$

$$\begin{array}{r} 9C138 \\ - 5A001 \\ \hline \end{array}$$

5. Anna has 60 coins which should be identical but one of them is fake. The fake one looks the same as all other coins but is lighter. Using the balance scales (but no weights — so you have to put coins on both platforms), what is the fastest way of finding the fake coin? What if you do not know whether the fake coin is lighter or heavier than the real one?
6. Towers of Hanoi. Legend has it that a group of Eastern monks are the keepers of three towers on which sit 64 golden rings. Originally all 64 rings were stacked on one tower with each ring smaller than the one beneath. The monks are to move the rings from this first tower to the third tower one ring at a time but never moving a larger ring on top of a smaller one. Once the 64 rings have all been moved, the world will come to an end. *[This legend is actually not true — but it is a nice one anyway]* Can you suggest a strategy for doing smaller numbers (e.g., start with just 2 rings, then 3 rings, then 4). You can use disks from a baby toy pyramid, or you can play this game online, at <http://www.mathsisfun.com/games/towerofhanoi.html>.
7. Using a very simple ruler, compass, quadrille paper construct triangle with sides 6,8,10 quadrille units, as we did in class. Write down the steps. Keep in mind that your very simple ruler can make the straight line but can't measure the length.