

## MATH 7 - HANDOUT 1

### 1. REVIEW PROBLEMS

1. On the island of knights and knaves you meet two inhabitants, Zed and Alice. Zed tells you, 'I am a knight or Alice is a knave.' Alice tells you, 'Of Zed and I, exactly one is a knight.' What is Zed? What is Alice?
2. Write the truth table for each of the following formulas. Are they equivalent (i.e., do they always give the same value)?
  - (a)  $(A \text{ OR } B) \text{ AND } (A \text{ OR } C)$
  - (b)  $A \text{ OR } (B \text{ AND } C)$ .
3. Let  $A = [1, 3] = \{x \mid 1 \leq x \leq 3\}$ ,  $B = \{x \mid x \geq 2\}$ ,  $C = \{x \mid x \leq 1.5\}$ . Using interval notation, what are the following sets:  $\overline{A}$ ,  $\overline{B}$ ,  $\overline{C}$ ,  $A \cap B$ ,  $A \cap C$ ,  $A \cap (B \cup C)$ ,  $A \cap B \cap C$ .
4. How many numbers are there between 12 and 101 inclusive?
5. In how many ways can you arrange 5 books on a shelf?
6. A class of 20 students must choose a president and a vice-president. In how many ways can that be done?
7. How many 7-digit telephone numbers can be formed if the first digit cannot be 0 or 1?
8. Six people are seated around a circular table. How many seating arrangements are possible?
9. Evaluate:  $2^0 \cdot 2^{-5} \cdot 3^4 \cdot 3^{-2} \cdot 2^2$
10. Evaluate:  $\frac{2}{1} \cdot \frac{5^{-1}}{3} \cdot \left(\frac{8}{15}\right)^{-4} \cdot \left(\frac{15}{16}\right)^{-3} \cdot \frac{1}{2}$