



CE1901 HOMEWORK SET 1

INSTRUCTIONS

- **Work** these homework problems by yourself on three-hole punched engineering problems paper. ***Engineering problems paper*** can be purchased at the MSOE bookstore. Some companies call engineering problems paper an “engineering pad.” It is usually green or yellow in color. **Use** the graph paper side **only when drawing graphs**.
- **Do not use calculators** as you work your solutions.
- **Show all work** to receive partial credit.
- **Showing work** means that you illustrate the process you take to complete a problem.
- **Print and three-hole punch** this coversheet. **Staple** to your solution packet.
- **Submit** your paper solution packet at the start of the **second lecture of week 2**.

ASSIGNED PROBLEMS

1. **Convert** base-10 number 2098 to a 16-bit unsigned base-2 number.
2. **Use** the repetitive division algorithm to convert decimal number 678 to base-5.
3. **Convert** binary 1111_1010_0101_1011_0010_0110_1100_0001 to hexadecimal.
4. **Convert** hexadecimal A938B46D to binary.
5. **State** the maximum unsigned number that can be encoded in 20 bits. **Include** the general equation you use to calculate it and the decimal result.
6. Dr. Meier counts laps while running on the Kern Center track by using binary on the fingers of his left hand. He still has all five fingers after all these years. He represents a 0 as a finger curled into the palm. He represents a 1 as an extended finger. What is the maximum number of laps he can run before overflowing his fingers when counting in binary?
7. Martians have three fingers on each hand. They record all their numbers and work arithmetic in base-6 using the symbols 0, 1, 2, 3, 4, and 5. **Add** decimal number 95 and decimal number 134 like a Martian. In other words, **write** each decimal number as a base-6 number, **complete** addition, and **show** appropriate energy carries between columns.
8. **Write** decimal number 20,416 as a binary number. **Separate** the binary number into nibbles. **Write** the number in hexadecimal.
9. Octal is the common name for base-8 like hexadecimal is the common name for base-16. Octal uses the symbols 0, 1, 2, 3, 4, 5, 6, and 7. Because eight is a power-of-2, you can separate long binary numbers into 3-bit chunks and then quickly write the octal equivalent. **Write** decimal number 42,787 as a binary number. **Separate** the binary number into nibbles. **Write** the number in hexadecimal. **Separate** the binary number into 3-bit chunks. **Write** the number in octal.
10. **Determine** if $11010101 + 00110111$ overflows the 8-bit number line. **Hint:** use addition.

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