Introduction to Computer Science I.
First Midterm Test
2017. October 19.

1. Determine the remainder we get if we divide 799^{801} by 264.

2. The remainder of 107 times an integer when divided by 532 is 102 more than the remainder of the integer itself when divided by 532. What can the remainder of this integer be when divided by 532?

3. The last digit of an integer in the numerical system of base 16 is '13'. What can its last digit be in the numerical system of base 12?

4. Consider the plane which perpendicularly intersects the line connecting $P(3, -2, 5)$ and $Q(7, -4, 11)$ in P. Does this plane contain the point $R(-4, 1, 3)$?

5. Suppose that the vectors $\underline{u}_1, \underline{u}_2, ..., \underline{u}_{10}$ in $\mathbf{R}^n$ are linearly dependent, but any 9 of them are linearly independent. Show that any linear combination of $\underline{u}_1, \underline{u}_2, ..., \underline{u}_{10}$ giving the $\underline{0}$ either all the coefficients are 0 or none of the coefficients are 0.(That is, show that if $c_1\underline{u}_1 + c_2\underline{u}_2 + ... + c_{10}\underline{u}_{10} = \underline{0}$ holds then either $c_1 = c_2 = \cdots = c_{10} = 0$ or $c_1 \cdot c_2 \cdot ... \cdot c_{10} \neq 0$.)

6. Determine the subspace generated by the vectors in $\mathbf{R}^3$ below. If that subspace is a line or a plane, determine its (system of) equation(s).

$$\underline{a} = (3, 1, 0)^T, \ \underline{b} = (5, 2, 1)^T, \ \underline{c} = (3, 2, 3)^T$$

The full solution of each problem is worth 10 points. Show all your work! Results without proper justification or work shown deserve no credit.
Notes and calculators (and similar devices) cannot be used.
Grading: 0-23 points: 1, 24-32 points: 2, 33-41 points: 3, 42-50 points: 4, 51-60 points: 5.