3) (10 pts) ALG (Base Conversion)

Perform each of the requested base conversions (the base of each number is written as a subscript):

(a) (2 pts) 347_{10} = 2342 $_5$

5 | 347
5 | 69 R 2
5 | 13 R 4
5 | 2 R 3

Grading: 1 pt for answer, 1 pt for process

(b) (2 pts) 361_7 = 190 $_{10}$

$361_7 = 3 \times 7^2 + 6 \times 7^1 + 1 = 3 \times 49 + 42 + 1 = 147 + 42 + 1 = 190$

Grading: 1 pt for answer, 1 pt for process

(c) (3 pts) $3AD_{16}$ = 001110101101 $_2$

$3AD_{16} = 0011\ 1010\ 1101_2$, since 16 is a perfect power of 2, we can convert each hex character to exactly 4 bits. These conversions are common enough most CS students can be expected to have them memorized, so there's no need to show work except for writing the answer down.

Grading: Based on answer only, 1 pt for first 4 bits, 1 pt for next for bits, 1 pt for last four bits. All 4 bits have to be correct in the group to get the point.
Give full credit for any valid process (16 → 10 → 2 is harder but valid)

(d) (3 pts) 247321_8 = 110323101 $_4$

$247321_8 = 010\ 100\ 111\ 011\ 010\ 001_2$ (As previously mentioned, we can convert to base 2 in this manner since 8 is a perfect power of 2).

Now, we can use similar thinking to convert from base 2 to base 4. Just remember to grab bits from the right to the left:

$010\ 100\ 111\ 011\ 010\ 001_2 = \ 01\ 01\ 00\ 11\ 10\ 11\ 01\ 00\ 01_2 = 110323101_4$

Grading: 1 pt for intermediate step to base 2, 2 pts for final answer
Give full credit for any valid process (8 → 10 → 4 is harder but valid)
Note: Leading 0s are not necessary for full credit.