Pythagorean numbers

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7 laboratory work (1)

- Numbers x, y and z are called Pythagorean numbers if they satisfy the formula:

$$x^2 + y^2 = z^2$$

- Your task is to find all integer Pythagorean numbers where $x, y \in \{1, \ldots, 1000\}$.

- You must use *SSE* instructions to perform checking are the x, y integer Pythagorean numbers.

- Looping, output may be done in C.

7 laboratory work (2)

- Hints:
  - There is no *SSE* command to raise number to power of 2, but there is a multiply command.
  - There are square root commands in *SSE* instruction set.
- Evaluation:
  - Simple execution **(0.84 points).**
  - Parallel execution by using all power of *SSE* (4 numbers in parallel) **(1.2 points).**

Possible realization

1	2	3	4	xmm0	First 4 values
2	3	4	5	xmm1	Second 4 values
1	4	9	16	xmm2	Squares of first
4	9	16	25	xmm3	Squares of second
5	13	25	41	xmm4	Sum of squares
2,23607	3,60555	5	6,40312	xmm5	Square root of previous sum
2	3	5	6	xmm5	integer of previous square
4	9	25	36	xmm5	square of previous integer
-1	-4	0	-5	xmm5	difference or comparison of xmm5 and xmm4

Found !

Example of the roots calculation

```c
int main ( int argc, char** argv) {

        __declspec(align(16))float fmas[16]={0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15};
        __declspec(align(16))float fgmas[16];
        int imsize = sizeof(fmas)/sizeof(float);

        float* fptr;
        float* fgptr;

        for ( int i = 0; i < imsize; i+=4){
                fptr = fmas + i;
                fgptr = fgmas + i;
                __asm{
                        mov eax,fptr
                        movaps xmm0,[eax]
                        sqrtps xmm0,xmm0
                        mov eax,fgptr
                        movaps [eax],xmm0
                }
        }
        for ( int i = 0; i < 16; i++) {
                printf("Squere from %.0f is equal to %.20f\n", fmas[i], fgmas[i]);
        }
        system("pause");
}
```