

CS5250 Advanced Operating Systems

Pop Quiz 3

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Write the snippet of x86-64 assembly code that will compute the polynomial:

$$a = 3x^3 - 4x^2 + 5x - 6$$

where “ a ” is `%rax` and x is in the memory location pointed to by `%rbp`. Both a and x are 64-bit integers. You may assume that all registers *other than* `%rbp`, `%rsp` and `%rip` are available for your use. The final answer is to be left in `%rax`.

Solution:

$$\begin{aligned} a &= 3x^3 - 4x^2 + 5x - 6 \\ &= x [3x^2 - 4x + 5] - 6 \\ &= x [x (3x - 4) + 5] - 6 \end{aligned}$$

Code:

```
movq (%rbp), %rax    #rax = x
movq (%rbp), %rbx    #rbx = x
addq %rbx, %rax      #rax = 2x
addq %rbx, %rax      #rax = 3x
subq $4, %rax        #rax = 3x-4
imulq %rbx, %rax     #rax = x(3x-4)
addq $5, %rax        #rax = x(3x-4)+5
imulq %rbx, %rax     #rax = x[x(3x-4)+5]
subq $6, %rax        #rax = x[x(3x-4)+5]-6
```