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Program Structure and Algorithms (INFO 6205)
Quiz #1 – 30 points

Student NAME:

Student ID:

Question 1 (8 points)**.** *Please find the $O(\cdot)$ complexity of growth for the following functions.*

(a) *(4 points)* $f(x) = 5x! + 4x^3 \log x$.

(b) *(4 points)* $f(x) = 5x^6 - 4x^3 + 1$.

Question 2 (8 points)**.** *Please rank the following four functions based on their $O(\cdot)$ complexity of running time. The function that has the least complexity should be ranked 1. Please explain your answer to get full credit.*

$f_1(x) = 7\sqrt{x}$; $f_2(x) = x^3$; $f_3(x) = \log_2 x$; $f_4(x) = \sqrt[3]{x}$

Question 3 (4 points)**.** *You are given a numpy array A = np.array([[1. , 4. , 5.], [9. , 7. , 4.]]). Please state what the following commands will print*

(a) *(1 points) print(A − 2)*

(b) *(1 points) print(A**2)*

(c) *(2 points) print(A[0, :-1])*

Question 4 (10 points)**.** *In a postfix expression,* $*$ *an operator is written after its operands. That is,* $2 + 3$ *is* $2\ 3 +$ *in postfix notation. The operations are performed in the order in which they are written (left to right).*

Suppose you are given a postfix expression such as $5\ 9\ 3 + 4\ 2 * * 7 + *$*. Please explain in English how you can use a stack or queue to evaluate a postfix expression as this. (the postfix expression is equivalent to* $5 * ((9 + 3) * (4 * 2) + 7)$ *which evaluates to 515).*