*School of Software Engineering*

UNIVERSITYOF SCIENCE AND TECHNOLOGY OF CHINA

**Compilers, Spring 2024**

**Quiz 9: Control-flow Analysis**

Name: Id:

1. Consider the control-flow graph at right, with 0 being the entry block and 4 the exit block. Answer the following 4 questions.

0

1

5

6

8

7

2

3

4

(a) Draw the dominator tree for this CFG.

(b) Calculate, for each block i, the dominance frontier DF[i].

(c) Suppose that this CFG is generated by the Tiger compiler that you are hacking, and suppose there is *a use* of a variable x in the block 7.

As Java specifies that each local variable must be initialized before its use, so a Java compiler (hence your Tiger compiler) should issue an error for this uninitialized variable. To suppress this error, you can just add *one* assignement statement somewhere in the program:

**x = 0;**

Question: in which block you can put the above assignment statement? (Hint: of course, you can put it into block 7, just before the variable use. But there should be other feasible blocks besides block 7.)

(d) Continue from the question (c), suppose that there are two uses of the variable x, one in block 7 and the other in block 2, in which block you can put the assignment statement?