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CPSC 457 - Fall 2017

Assignment 4

Due Friday, Nov 17, 2017 at 11:59pm.
Individual assignment. No group work allowed.
Weight: 5% of the final grade.

Question 1:

Let there be 3 processes: P0, P1, and P2.
Let there be 1 resource type A with 2 instances.

Then a snapshot of an unsafe state may look like this:

	Allocation	Max	Available	Need
	A	A	A	A
P0	1	2	1	0
P1	0	2		2
P2	0	1		1

Let the following be a sequence of execution leading to a deadlock: **P1-P0-P2**
Upon granting the 1 available resource to P1, both resources are allocated to P0 and P1 respectively, but neither has enough resources to finish executing. Thus, a deadlock occurs.

Let the following be a sequence of execution not leading to a deadlock: **P2-P0-P1**
P2: available = 1 + 0 → 1
P0: available = 1 + 1 → 2
P1: available = 2 + 0 → 2

Question 2:

The following state is given.

	Allocation	Max	Available	Need
	A B C D E	A B C D E	A B C D E	A B C D E
P0	1 0 2 1 1	1 1 2 1 3	0 0 **x** 1 2	0 1 0 0 2
P1	2 0 1 1 0	2 2 2 1 0		0 2 1 0 0
P2	1 1 0 1 0	2 1 3 1 0		1 0 3 0 0
P3	1 1 1 1 0	1 1 2 2 1		0 0 1 1 1

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The smallest possible value for x is 1, such that $\text{Available}_{ABCDE} = (0,0,1,1,2)$.
The step-by-step execution order using the Safety Algorithm (i.e. Banker's Algorithm) looks as follows:
P3: available = (0,0,1,1,2) + (1,1,1,1,0) = (1,1,2,2,2)
P0: available = (1,1,2,2,2) + (1,0,2,1,1) = (2,1,4,3,3)
P2: available = (2,1,4,3,3) + (1,1,0,1,0) = (3,2,4,4,3)
P1: available = (3,2,4,4,3) + (2,0,1,1,0) = (5,2,5,5,3)