

Week 1 (Basic)

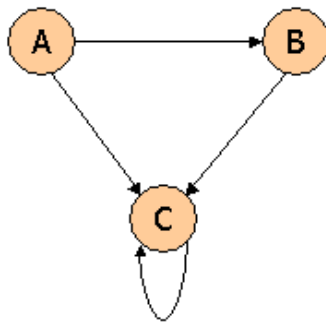
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The **due date** for this quiz is **Mon 16 Feb 2015 11:59 PM PST**.

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Question 1

Consider three Web pages with the following links:

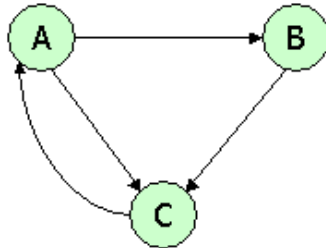


Suppose we compute PageRank with a β of 0.7, and we introduce the additional constraint that the sum of the PageRanks of the three pages must be 3, to handle the problem that otherwise any multiple of a solution will also be a solution. Compute the PageRanks a , b , and c of the three pages A, B, and C, respectively. Then, identify from the list below, the true statement.

- ☐ $a + b = 0.655$
- ☐ $a + c = 2.035$
- ☐ $a + c = 2.595$
- ☐ $b + c = 2.5$

Question 2

Consider three Web pages with the following links:

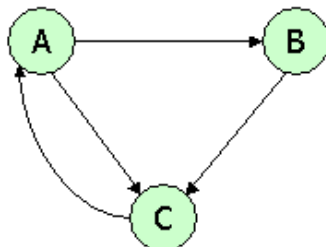


Suppose we compute PageRank with $\beta=0.85$. Write the equations for the PageRanks a , b , and c of the three pages A, B, and C, respectively. Then, identify in the list below, one of the equations.

- ☐ $a = c + .15b$
- ☐ $a = .9c + .05b$
- ☐ $.95b = .475a + .05c$
- ☐ $.85a = c + .15b$

Question 3

Consider three Web pages with the following links:



Assuming no "taxation," compute the PageRanks a , b , and c of the three pages A, B, and C, using iteration, starting with the "0th" iteration where all three pages have rank $a = b = c = 1$.

Compute as far as the 5th iteration, and also determine what the PageRanks are in the limit. Then, identify the true statement from the list below.

- ☐ After iteration 5, $a = 21/16$
- ☐ After iteration 5, $b = 5/8$
- ☐ After iteration 5, $b = 1/2$
- ☐ After iteration 5, $b = 9/16$

Question 4

Suppose our input data to a map-reduce operation consists of integer values (the keys are not important). The map function takes an integer i and produces the list of pairs (p, i) such that p is a prime divisor of i . For example, $\text{map}(12) = [(2, 12), (3, 12)]$.

The reduce function is addition. That is, $\text{reduce}(p, [i_1, i_2, \dots, i_k])$ is $(p, i_1 + i_2 + \dots + i_k)$.

Compute the output, if the input is the set of integers 15, 21, 24, 30, 49. Then, identify, in the list below, one of the pairs in the output.

- ☐ (2, 47)
- ☐ (2, 54)
- ☐ (3, 69)
- ☐ (7, 48)

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