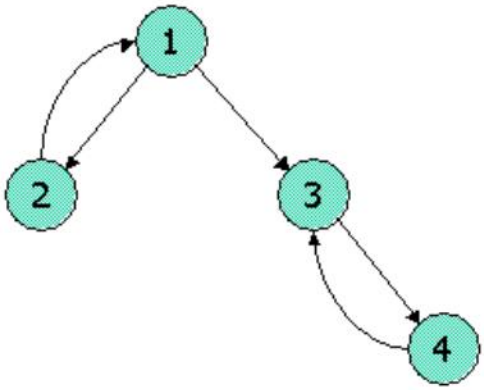
Feedback — Week7B Basic

Help Center

You submitted this quiz on **Sat 14 Mar 2015 5:59 PM PDT**. You got a score of **2.00** out of **2.00**.

Question 1

Compute the Topic-Specific PageRank for the following link topology. Assume that pages selected for the teleport set are nodes 1 and 2 and that in the teleport set, the weight assigned for node 1 is twice that of node 2. Assume further that the teleport probability, (1 - beta), is 0.3. Which of the following statements is correct?



Your Answer		Score	Explanation
TSPR(2) = .8998			
TSPR(4) = .4787			
TSPR(1) = .2455			
TSPR(2) = .2252	✔	1.00	
Total		1.00 / 1.00	

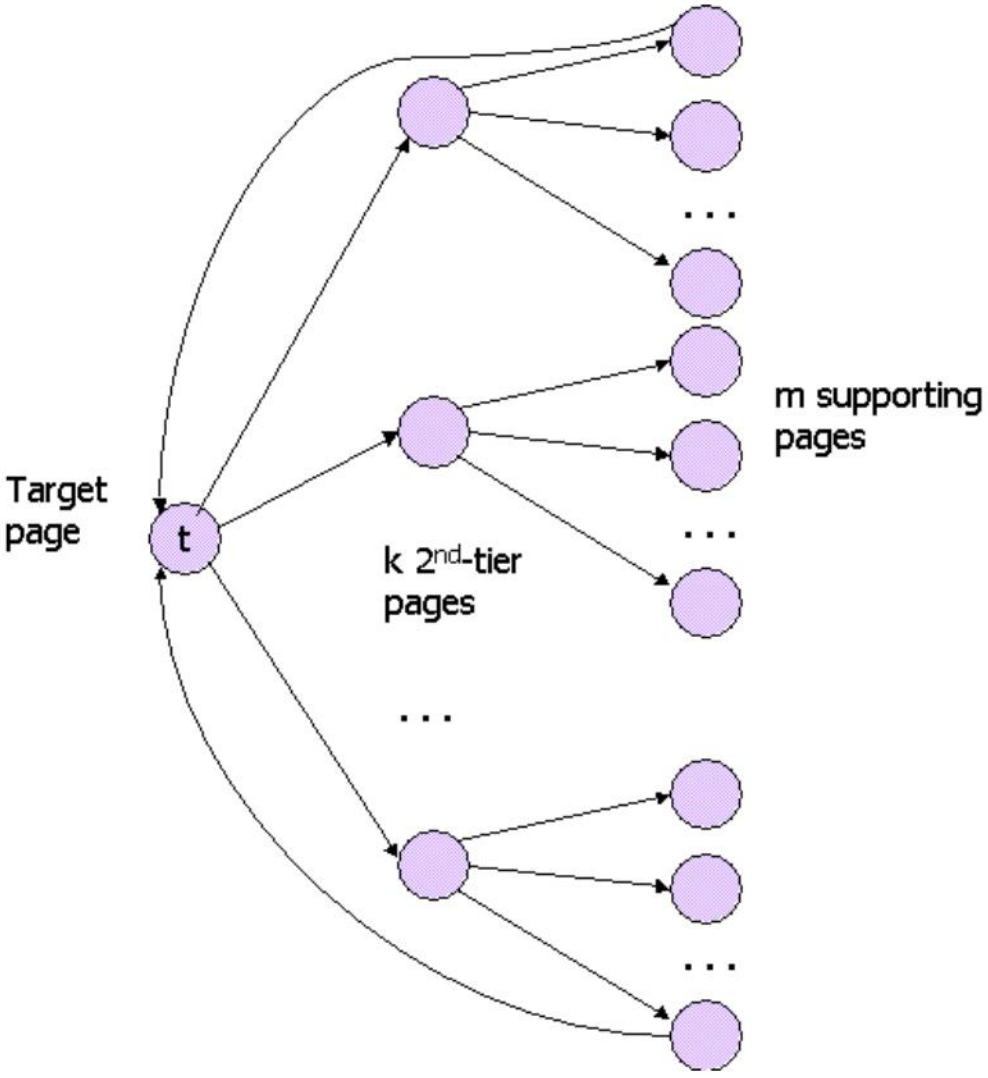
Question Explanation

"the weight assigned for node 1 is twice that of node 2" means that given a random walker and its

current position, its teleport probability to node 1 is twice that to node 2.

Question 2

The spam-farm architecture described in Section 5.4.1 suffers from the problem that the target page has many links --- one to each supporting page. To avoid that problem, the spammer could use the architecture shown below:



There, k "second-tier" nodes act as intermediaries. The target page t has only to link to the k second-tier pages, and each of those pages links to m/k of the m supporting pages. Each of the supporting pages links only to t (although most of these links are not shown). Suppose the taxation parameter is $\beta = 0.85$, and x is the amount of PageRank supplied from outside to the target page. Let n be the total number of pages in the Web. Finally, let y be the PageRank of target page t. If we compute the formula for y in terms of k, m, and n, we get a formula with the form

$$y = ax + bm/n + ck/n$$

Note: To arrive at this form, it is necessary at the last step to drop a low-order term that is a fraction of 1/n. Determine coefficients a, b, and c, remembering that β is fixed at 0.85. Then, identify the value, correct to two decimal places, for one of these coefficients.

Your Answer		Score	Explanation
b = 0.46			
a = 2.59	✔	1.00	
b = 0.21			
c = 0.33			
Total		1.00 / 1.00	

Question Explanation

Let w be the PageRank of each of the second-tier pages, and let z be the PageRank of each of the supporting pages. Then the equations relating y, w, and z are:
$y = x + \beta zm + (1-\beta)/n$
$w = \beta y/k + (1-\beta)/n$
$z = \beta kw/m + (1-\beta)/n$

The first equation says that the PageRank of t is the external contribution x, plus βz (the amount of PageRank not taxed) times the number of supporting pages, plus (1-β)/n, which is the share of "tax" that every page gets. The second equation says that each second-tier page gets 1/k-th of the untaxed PageRank of t, plus its share of the tax. The third equation says each supporting page gets 1 part in m/k of the untaxed PageRank of the second-tier page that reaches that supporting page, plus its share of the tax.

Begin by substituting for z in the first equation:

$y = x + \beta^2 kw + \beta(1-\beta)m/n + (1-\beta)/n$

Now, substitute for w in the above:

$y = x + \beta^3 y + \beta(1-\beta)m/n + \beta^2(1-\beta)k/n + (1-\beta)/n$

Neglect the last term (1-β)/n, per the directions in the statement of the problem. If we move the term $\beta^3 y$ to the left, and note that $\beta^3 = (1-\beta)(1+\beta+\&beta^2)$, we get

$y = x/(1-\beta^3) + (\beta/(1+\beta+\&beta^2))(m/n) + (\beta/(1+\beta+\&beta^2))(k/n)$

For β = 0.85, these coefficients evaluate to:

$y = 2.59x + 0.33(m/n) + 0.28(k/n)$