Ralph's Financial Statement Analysis

Ralph is intrigued with Coldwater Creek and decides to undertake some historical analysis. Coldwater Creek, located in Idaho, operates a direct mail catalog business. Items marketed through these catalogs include women's and men's apparel, jewelry, and household items.

Ralph's task is to understand their operations based on recent past results reported in their financial statements. Understanding their operations can be thought of as identifying the transactions and amounts that they have recently undertaken. Accordingly, he'll try to infer their transactions from their financial statements reported for fiscal x7.

While Ralph won't be able to uniquely identify all of the transactions amounts, he will be able to completely characterize their transactions. Additionally, starting from his prior beliefs regarding transactions he can identify a best guess regarding x7 transactions and also identify any remaining uncertainty.

The income statement and beginning and ending balance sheets for Coldwater Creek, Inc. for fiscal year x7 are as follows.

Income Statement

Net Sales	246,697
Cost of sales	120,126
GROSS PROFIT	126,571
Selling, Gen'l. and Admin.	107,083
INCOME FROM OPERATIONS	$19,488
Interest, net, and other	57
INCOME BEFORE PROVISION FOR INCOME TAXES	$19,545
Provision for income taxses	7857
NET INCOME	$11,688

Balance Sheets	2-28-x8	3-10-x7
CURRENT ASSETS		
Cash	331	9095
Receivables	4019	2342
Inventories	53,051	25,279
Prepaid expenses	2729	456
Prepaid catalog costs	2794	1375
TOTAL CURRENT ASSETS	62,924	38,547
Deferred catalog costs	7020	3347
Property and equipment	26,661	20,080
Executive loans	1620	--
TOTAL ASSETS	$98,225	$61,974
CURRENT LIABILITIES		
Revolving line of credit	10,264	--
Accounts payable	27,275	18,061
Accrued liabilities	10,517	5969
Income taxes payable	--	451
Deferred income taxes	919	76
TOTAL CURRENT LIABILITIES	$48,975	$24,557
Deferred income taxes	375	230
TOTAL LIABILITIES	$49,350	$24,787
STOCKHOLDERS' EQUITY		
Preferred Stock	--	--
Common Stock	101	101
Additional Paid-in capital	38,748	38,748
Retained earnings	10,026	(1662)
TOTAL STOCKHOLDERS' EQUITY	$48,875	$37,187
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$98,225	$61,974

Additional disclosures:

Amortization of catalog costs is $66,600 as reported in footnote 1.
Depreciation of property & equipment is $3,738 as reported in the cash flow statement.
The current portion of income taxes is $6,869 as reported in footnote 7 and implied by the cash flow statement.

Ralph believes the following 26 transactions reflect the recognized accounting activities of Coldwater Creek.

1. Collection of accounts receivable
2. Payment of accounts payable
3. Payment of accrued liabilities
4. Cash payments for prepaid expenses
5. Acquire property, plant, and equipment for cash
6. Cash payment to reduce income taxes payable
7. Cash loaned to executives
8. Cash received on revolving line of credit
9. Sales on account
10. Recognizing SG&A expenses and accruing accounts payable
11. Decreasing inventory and recognizing cost of goods sold.
12. Decreasing deferred catalog costs and recognizing SG&A
13. Recognizing SG&A expenses and accruing (accrued) liabilities
14. Amortizing prepaid expenses to SG&A
15. Amortizing property, plant, and equipment to SG&A
16. Recognizing tax expense and accruing taxes payable
17. Recognizing tax expense and accruing deferred taxes (short-term)
18. Recognizing tax expense and accruing deferred taxes (long-term)
19. Recognizing interest revenue on executive loans
20. Recognizing interest expense on the revolving line of credit
21. Reclassifying long-term deferred taxes as short term
22. Reclassifying short-term deferred taxes as taxes payable
23. Applying accrued liabilities to catalog inventory (prepaid catalog cost)
24. Reclassifying prepaid catalog cost as deferred (when catalogs mailed)

25. Acquiring inventory on account

26. Recognizing SG&A for the difference between the market interest rate and the amount charged to executives for executive loans

Required:

1. What were the 26 transaction amounts that generated these financial statements? (Hint: You should discover that the answer is that there are infinite transaction vectors; however, they are all related to each other in a systematic fashion. It can be quite helpful to see the entire financial statement system on one page. A directed graph can achieve this task and a directed graph is possible because of the double entry nature of accounting. A directed graph connects accounts via transactions involving the accounts and with an arrow in the direction of the debit entry. Hence, directed graphs of financial statements have m nodes (the accounts), n arcs (the transactions), and loops. The loops identify where and how the indeterminancy of the invertibility problem resides. Since any amount can be applied to any loop, whenever there is a loop there are infinitely many sets of transactions that are consistent with the financial statements. That is, different transaction vectors are related by putting different weights on the loops. A direct application of Euler's theorem immediately identifies the number of loops. Since there are 26 transactions and 19 accounts, there are 8 loops (n - m + 1).

A quick way to identify the loops is to draw the directed graph. The directed graph for Coldwater Creek for fiscal x7 is below.

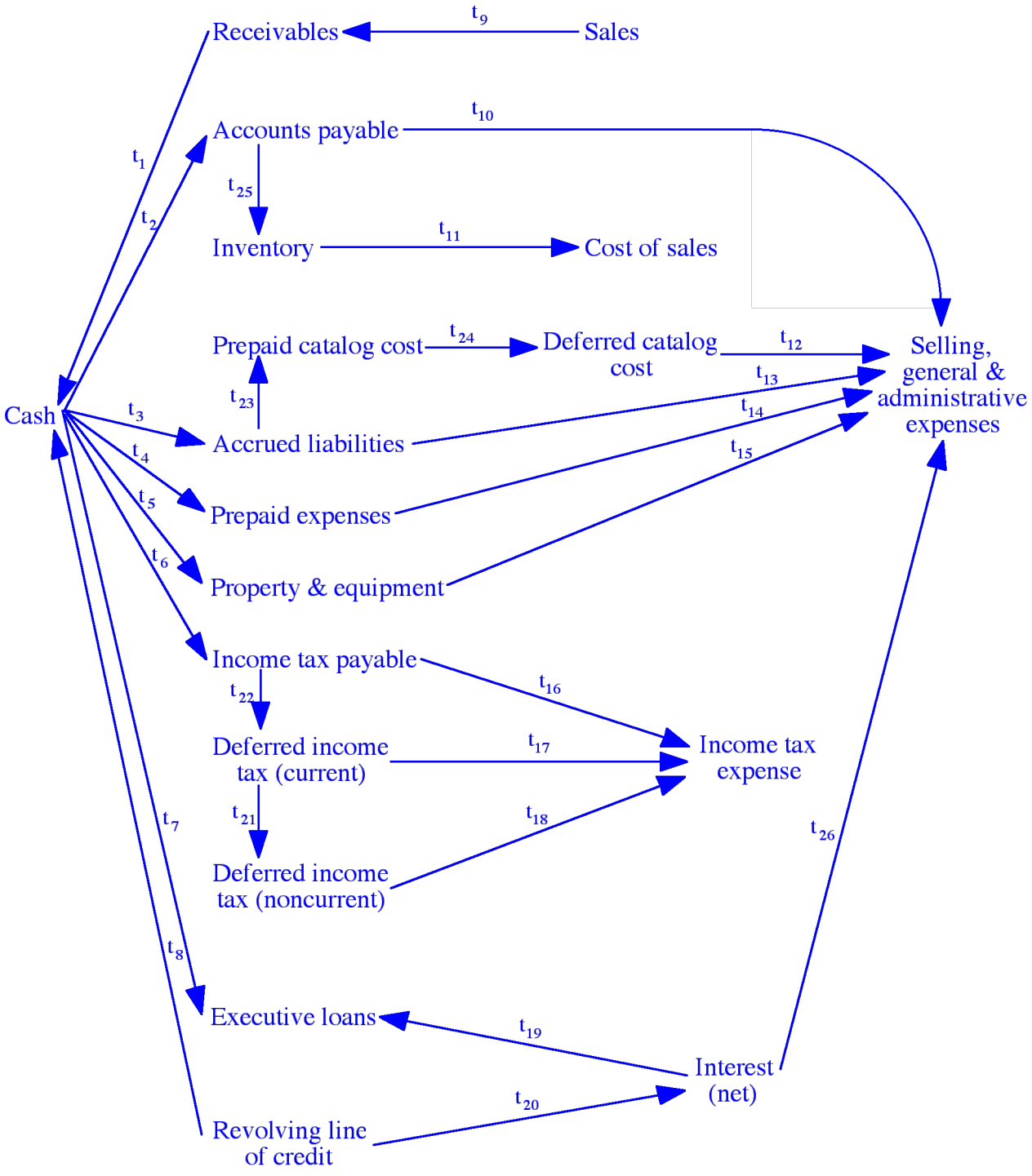

Figure. A Directed Graph for Coldwater Creek, Inc. Fiscal x7

The loops are the sets of transactions that can be combined to start and end at the same account by following the transactions. If the direction of the arrow needs to be reversed

to continue along the path then we assign -1 to the transactions. Accordingly, the eight loops can be identified as follows: Loop 1 (2, -3, 10, -13); Loop 2 (3, -4, 13, -14); and so on.)

2. Identify the complete set of loops and the complete set of transactions amounts. The complete solution for the 26 transactions is

$$y = y_p + y_{n1}k_1 + y_{n2}k_2 + y_{n3}k_3 + y_{n4}k_4 + y_{n5}k_5 + y_{n6}k_6 + y_{n7}k_7 + y_{n8}k_8$$

where y is the vector of transactions, y_p is a particular solution for transaction, y_{ni} is the vector identifying loop i, and k_i is the weight on loop i, with k_1 through k_8 representing the unknown, arbitrary weight on loops 1 through 8.[1]

(Hint: Loops can be broken by setting one transaction in a each loop to a fixed amount (for convenience set them to zero. In other words, form a spanning tree, for example, by setting transactions 10, 12, 13, 15, 16, 17, 20, and 26 to zero.).

3. The above complete solution can be narrowed by adding the following three pieces of data to solve weights on three loops: amortization of catalog costs, depreciation of property & equipment, and current portion of income taxes. Amortization of catalog costs is $66,600 as reported in footnote 1. Identify the revised solution.
(Hint: You should narrow the number of loops, and arbitrary k's, from eight to five.)

[1] In matrix notation, a general solution to $Ay = x$ is $y = y^p + N^T k$ where N is an n-m+1 by n matrix of loops.

4. Suppose before observing Coldwater's x7 financial statements Ralph believes that the expected values of the 26 transactions are as follow: $\bar{y}$ = (250,000; 150,000; 65,000; 5,000; 4,000; 6,000; 0; 1,000; 250,000; 35,000; 125,000; 60,000; 5,000; 5,000; 4,000; 6,000; 0; 0; 2,000; 1,000; 0; 0; 60,000; 60,000; 125,000; 1,000). Further, suppose Ralph believes it instructive to consider the variance-covariance matrix that captures the uncertainty about transactions is $10{,}000^2$*I where I is the identity matrix (a 26 x 26 matrix with ones on the diagonal and zeroes elsewhere).

a. Identify the best guess of transactions given the x7 financial statements (including the additional disclosures beyond the income statements and balance sheets) .

(Hint: The best guess of transactions amounts given the x7 financial statements (including the additional disclosures beyond the income statements and balance sheets) is determined via the following linear (matrix) algebra.
$y_p - N^T(NN^T)^{-1}Ny_p + N^T(NN^T)^{-1}N\bar{y}$ where y_p is the particular y identified in 3 above.)

b. Identify the remaining uncertainty in terms of the residual covariance matrix.

(Hint: The remaining uncertainty about transactions is captured through the following variance-covariance matrix $10{,}000^2*N^T$ Var[k] N, where N is the 5 x 26 matrix of loops (see your revised complete transactions vector) ,N^T is its transpose, and
Var[k] = $(NN^T)^{-1}$.)

5. Utilize the directed graph to prepare a statement of cash flows for fiscal period x7 for Coldwater Creek.