MACHINE METHODS OF ACCOUNTING

SELECTION AND TRAINING OF KEY PUNCH OPERATORS

The degree of efficiency attained by key punch operators is greatly influenced by the character and thoroughness of their preliminary training. Assuming that the individual to be instructed has the qualifications necessary for the position, the training methods outlined in the following sections will generally furnish satisfactory results.

Selection

Experience has shown that certain personal qualifications should be considered in the selection of operators for training to insure the best results. Individuals possessing the following characteristics have proved highly satisfactory:

1. Education—Preferably high school graduate. Two years of high school, or the equivalent in commercial training, may be taken as a minimum.
2. Neatness.
3. Agreeable personality.
4. Alertness.

Importance of Accuracy

The necessity for accuracy should be impressed upon all potential key punch operators. Accounting reports must present a true picture of the results of the transactions of a business. All records must be carefully prepared and transcribed in order to prepare these essential accurate financial statements and reports. Any errors which may be introduced through carelessness must be discovered and corrected.

Key punch operators must appreciate their responsibility for accuracy in the punching of cards which will serve as a medium of preparing final tabulated reports. They should also realize that the location of errors represents an additional operation involving unnecessary or avoidable costs. Speed of punching is important; but accuracy should never be sacrificed.

Outline of Training

The training of operators falls naturally into three divisions:

1. Mechanical operation of punches.
2. Keyboard exercises.
3. Punching from actual business documents.

Properly selected individuals should be capable of completing the required training and developing necessary speed for all reasonable production in actual work in approximately two or three weeks. The procedure to be followed in each of the phases of instruction is briefly described.

Mechanical Operation

The operation of the electric key punch (Type 11) should be explained to illustrate the general mechanics of punching equipment. Other models of punches may be explained just prior to their use at the conclusion of the training period. These instructions may be taken directly from the machine descriptions pertaining to each unit of equipment which appear in separate sections of this book.

The following paragraphs contain a formal demonstration of the Electric Accounting Machine Method, frequently employed by sales representatives when demonstrating IBM machines. As it includes so many important facts about this method and presents them in such a vivid and intelligible manner, it is well adapted for use at this time in showing the operator the part played by each of the major units of this method. Again, special emphasis should be placed on the importance of the accuracy of punching in each succeeding step of the system.

"I shall show you the Electric Accounting Machine Method, which was originally described by Dr. Hollerith, the inventor, as a means of cross-indexing information. Today it is recognized generally as the quickest and most dependable means of analyzing business facts, such as inventory investments, sales by salesman, territory, product, class of trade, etc.; of preparing accounting records, such as journals, general and subsidiary ledgers, trial balances, etc.; and of making documents of various descriptions, such as job tickets, requisitions, invoices, and the like.

"While tabulating machines can be applied to sales analyses, inventories, accounts receivable, journal entries, etc., the principle of the Electric Accounting Machine Method and the general advantages of it can be illustrated by taking this job ticket, which is typical of those in use by manufacturing plants."
"It shows that in Department 31, Man No. 189, J. M. Franklin, on December 2nd, worked on Order No. 345, Operation No. 16, for two and a half hours and produced seventy-five good pieces for which he received two cents each, or $1.50. It was direct labor. Now, mean to the machines exactly what the written information means to us.

"Notice that the operator can concentrate on production, for the punching machine automatically feeds and ejects the cards. That is why under the manual method these tickets, as they come in each day, are added up for a control total. To prepare the payroll at the end of the pay period, it is necessary to sort them into employee sequence. Then to distribute them to the proper cost classification, whether it be order number, department, or account number, it is necessary to sort them a second time, and so on for each desired record. And each time they are sorted they must be added, and then the totals secured of each classification must be balanced to the control totals which we have previously established. Sometimes, they must be re-added because the figures do not balance. And then, the last operation is to record the figures in the form of a payroll register, cost analysis, or whatever distribution is required.

"If we could put these tickets in some kind of machine and, by pressing a button, get all the answers, it would be fine. But, as we all know, it can't be done. There is no machine that will read the various kinds of writing which appear on this or any other original record.

"But suppose we take this job ticket and punch holes that will put the written information in a form in which it can be handled by automatic machines. (Put in automatic key punch.) In other words, these punched holes this method of recording is so fast and so accurate. Because this recording machine is also simple, proficiency in its use is quickly acquired. Average operators prepare from 250 to 800 cards an hour according to the number of holes to be punched and the readability of the source data.

"While these holes in the card are for the purpose of operating the machines, I should like you, as a matter of interest, to note, 1, 2, 0, 2, for December 2nd; 3, 1, for Department Number; 1, 8, 9, for Clock Number; 3, 4, 5, for Order Number; 1, 6, for Operation; 2, 5, for Hours; 7, 5, for Pieces; 1, 5, 0, for Amount, and DIR for Direct Labor. That completes the recording of data in the card; and it is practically the only manual operation of the punched card method of accounting. It corresponds to the recording of information once under any other method. But it gives us a medium which is preserved, which will automatically actuate electric sorting, multiplying, and accounting machines with the corresponding speed, accuracy, and economy of automatic machine performance used to such a great extent in shops.

"When using other methods, it is necessary to make as many entries of the item as there are reports involved—one for payroll, one for labor costs, and one for each other report re-
required. With the Electric Accounting Machine Method, the entry is made only once. (Point to holes in the card.) The machines do the rest.

"Figuratively speaking, the punched cards automatically can classify, multiply, add, subtract, divide, reproduce, and post themselves.

"Now, before we go to the demonstration of the sorting machine, are there any questions you would like to ask about the recording of information on the card? (Be sure everything is clear before proceeding to the sorter.)

"The sorting machine is designed to arrange the cards by Employee Number, Order Number, or other desired groupings or classifications. For the demonstration of this machine, I shall use a group of these same cards already punched. These cards, as you see, (Fan the cards) are not in numerical sequence.

"First, we shall sort them to Employee Number, which, of course, is preliminary to preparing the payroll. The cards are placed here in the feed of the machine. The machine is set (Set brush) to sort the units column of Employee Number, which on this card is column sixty-two, and then by pressing this button, the machine begins to sort the cards.

"The unit sort is now complete, and we shall take these cards from the “4” pocket and show you what has taken place. Here we have cards for Employee Numbers 294, 324, 354, and so on, but they are all 4’s in the units column. (Needle cards.) These cards from the “8” pocket are all 8’s in the units column. (Needle cards.)

"Now we shall remove these cards from the machine, placing the 0’s first, then the 1’s, 2’s, and so on. Setting the machine for the next sort, which is in the tens column, we shall go through a similar operation.

"That completes the sorting of the tens column, and now I want you to see what has happened in this sort. You will remember that when I stacked the cards after the unit sort, I placed the cards in order from 0 to 9. Now I shall take these cards from the “5” pocket. First we see that they are all 50’s; then 51, 52, 53, etc., follow in sequence, showing that the first sort to the units column has been preserved in our second sort to tens. That continues right on through the hundreds, or as far as we need to sort.

"There are about four hundred cards in this group which we are sorting. In order that you may realize the speed of this sorting operation, I should like you to time the machine on this next sort to hundreds. (Actually time the machine.)

"That completes the sort. It took about one minute, didn’t it? These cards you will find are now in complete numerical order. All cards of like Employee Number are grouped together for tabulation. Comparing this to manual sorting, time studies reveal in every case that automatic sorting is a great many times faster.

"Now for the next step let’s see the electric accounting machine, which prepares printed reports either on regular ruled forms or on paper fed from this roll. For this tabulation we shall use this sample printed payroll form. The cards are placed in the feed of the machine at this end. The pressing of this button starts the machine; the adding fields (Point to them) of the cards actuate the counters and the classification fields of the card actuate the machine so that it will print a total at each change in classification.

"We are now preparing on the machine a printed payroll showing the hours worked, the amount earned by each employee, together with a grand total of earnings for all employees.

"Every time that cross-head goes down, another card is added, and a total accumulated.
Notice how the machine automatically prints the employee number, the hours worked, and the amount earned; it spaces the payroll sheet for the next total and continues on adding the cards for the next employee. This machine adds at a speed of 9,000 cards an hour. 9,000 times 5 (Point to the counters) equals 45,000 items an hour as compared to 2,000 items an hour, which is good production on a keyboard adding machine.

"Each time the machine prints totals, it has accumulated the hours and earnings of one employee for the pay period. The number of job tickets in each accumulation ranges from ten to twenty-five, according to the number of jobs on which the respective employees have worked.

"This payroll sheet for 25 men, tabulated in less than five minutes, is now complete. We have here the total hours and the gross earnings for each employee, together with the grand total of earnings for all employees. Notice that the distribution to Employee Number is vertical and not horizontal. Accordingly, the number of classifications of a given distribution is unlimited.

"Having completed the payroll, we now want to distribute this time and money to the various manufacturing accounts or order numbers. Under the punched card plan, checks for a payroll need not be signed until the payroll has been distributed and the distribution and payroll balanced, because this distribution is secured by simply re-sorting these same cards to Order Number.

"These same cards are now re-arranged by Order Number and we shall place them in the feed of the machine at this end, and this printed distribution form in this end.

(Press the button and start the machine. While the machine is running, call attention to the speed at which reports can be secured.)

"Now we have completed the payroll distribution and have the hours and the amount of money charged to each Order Number. Notice this grand total. You see it is the same as the grand total shown here on the payroll sheet. It could not be otherwise, for we have used the same cards for both tabulations. Once we punch number 189, for instance, on a card, it cannot become 198, because punched holes are not subject to transposition or change.

"There is another function of this machine which I want to call to your attention. We are now going to list a detailed record of each job that made up the totals shown on the distribution sheet. In other words, we can provide all the detail required under any other method and show the totals which we have produced automatically.
"That completes the listing of the individual cards. Note the number of items shown on this list. It certainly calls your attention to the great amount of detail which, required to produce tabulated reports under other methods, can be eliminated.

"That covers, in general, the principle of the Electric Accounting Machine Method."

Punching Exercises

Before allowing the student operator to handle the key punch, the instructor should be sure that the purpose, functions, and mechanics of the machine are thoroughly understood. At this time, also, the operator should be impressed with the simplicity of the punching operation.

The first task of the training period is the memorizing of the standard key positions of the keyboard. For this purpose the Type 11 electric punch is used. The key punch must be operated by a touch system if average speed is to be acquired. The touch system for so few keys can be mastered easily and no excuses for looking at the keys should be accepted. Preliminary working exercises and a keyboard chart are furnished by IBM as an aid to the student.

The exercises, consisting of five punching lessons, are used primarily to familiarize the operator with the keyboard. The figures appearing on each page are to be transcribed to a single card. Upon the completion of punching each horizontal line of digits, the same card is fed back in the machine for punching in column one. Ten perfect cards are required from each lesson of the exercise. If the operator depresses each key correctly as she transcribes the information from each exercise sheet, each of these cards will be completely punched in all columns for each page, with the exception of the fourth. For this page, the 8 position of column 38 remains unpunched. This serves as a check to prove that she is performing the exercise properly.

For the operation of an electric key punch, it is recommended that the first three fingers of the right hand be used; the forefinger operating keys R-1-4-7, the second finger operating keys X-2-5-8, and the third finger operating keys 0-3-6-9. The resistance of the keys of the mechanical punch (Type 1) does not permit the use of the touch system in punching. For this type of punch, it is recommended that the second finger be used with the forefinger and thumb tips together against the first joint of the second finger (in the same relative position as if holding a pencil) and the third and fourth fingers closed against the palm of the hand.

Instruction in the positioning of the machine, punching data, unpunched cards, and punched cards, as well as the proper methods of feeding and removing cards, should all be given simultaneously with the punching of practice exercises. Thus the operator learns correct handling methods at the same time that she is becoming proficient on the keyboard. The following paragraphs outline the correct and approved methods of handling the key punching work.

Position.—The correct relative position of the punch keyboard and the operator should place the keyboard directly in front of the operator's right shoulder—on a level with the right forearm held in a horizontal position, with the upper arm at rest in a vertical position. Both upper and forearm muscles should be at rest and relaxed. Punching effort in the case of the manual punches should come from
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Numerical Punching Exercises
the wrist only and for the electric punches from the fingers and a slight wrist motion. The keyboard should be elevated to an angle of about 30 degrees from the horizontal.

Feeding the Cards (applies to punches without automatic feed).—The cards to be punched should be directly behind the punch, slightly to the left of the keyboard and above the top of the punch. The operator should insert the card with a rotary sweep of the right hand, extending the forearm and sweeping the hand from the keyboard over the cards. The tips of the forefinger and the second finger come into contact with the cards at the left edge and rub the top card off the pile to the left and toward the punch. The thumb closes under the left edge of the card as it leaves the pile. The right edge of the card is pressed downward and to the right into position in the punch. The fingers press the left edge under the latch, the thumb slides onto the card feed lever as released from the card, and pushes the card feed rack into initial position, which, upon completion of the rotary sweep of the hand, leaves the fingers over the keyboard in position to punch.

Removing the Card (applies to punches without automatic eject).—While the right hand is punching, the left hand is used to hold a ruler or straight edge as a guide to the reading of data. The punching data are placed at the left edge of the punch as shown in the procedure diagram below. As the card approaches the last few columns to be punched, the left hand is placed in position to pick up the end of the card. As the last hole is punched and simultaneously with the feeding of the next card with the right hand, the card that has been punched is removed by the left hand and placed face down directly in front of the punch.

The directional arrows show the path of the sweeping movement of both the right and the left hands. Both hands carry through with these movements simultaneously. When punching on a non-automatic feed duplicator, the right hand is used to pull the feed lever; the left hand follows the same movement as illustrated. Automatic punches, of course, eliminate the handling of cards entirely.

Several other procedures for the feeding and removal of cards have been developed. Some of these have been more readily adaptable to key punch operators' physical characteristics; others may be more satisfactory when dual cards or other special forms have been used for recording of original data. No one method of feeding and removing cards, therefore, can be recommended to the exclusion of others; but the method described above has been most generally adopted.

Actual Punching.—After the required number of cards have been punched from the keyboard exercise practice sets, the operator should be assigned actual punching work. A standard set of invoices, similar to the sample shown, should be transcribed to a suitable sales card such as the one illustrated.

Production of twelve hundred (1200) such cards a day of six hours is the minimum required for completion of the training. This production is usually attained by the average operator within two weeks.

Accuracy of all punched columns may be determined by subsequent verification on the key verifier by another operator or by tabulating all punched fields to obtain a total that can be compared with predetermined amounts.
### Representative Company

**SOLD TO**
Park Drug Stores
466 Highland Road
Yonkers, New York

**SHIPPED TO**

**DATE SHIPPED**
9/28/55
P. O. B. ENOCOTT N. Y. TERMS 30 DAYS NET

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### Statistical Copy

FOR CUSTOMER'S USE ONLY

INVOICE NO: R737
INVOICE DATE: 10/1/55

**SALES DEPT**

**E. M. CREDIT**

**COMMISSION**

**INSURANCE**

**ACCOUNTING DEPARTMENT**

**NEW & OLD**

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Specimen Invoice for Practice Punching

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**The Punched Tabulating Card**

Demonstrating the first step in the

**INTERNATIONAL ELECTRIC ACCOUNTING MACHINE METHOD**

**INTERNATIONAL BUSINESS MACHINES CORPORATION**

**Tabulating Machine Division**

270 BROADWAY ------- NEW YORK CITY, N. Y.

SALES OFFICES AND SERVICE BUREAUS
IN ALL PRINCIPAL CITIES

**Representative Company**

Tabulating Card for Above Invoice
**Duplicating Punch Exercises**.—After the operator has reached the required card production on the straight electric key punch, she is then trained on the duplicator. A thorough explanation of the duplicating machine is essential, particularly as to the semi-automatic feed, duplicating feature, and the duplicating stop button. The same Sales Analysis card in conjunction with a specially prepared master code card is used for practice punching, as this is an ideal application for the duplicating machine.

Usually it takes only about a day to familiarize an operator thoroughly with the operation of this machine, as she has already learned the keyboard from the straight electric key punch.

**Automatic Machine Exercises**.—The operator is trained next on the automatic machines.

A brief explanation of the automatic feeding and ejecting device is given. No other explanation is needed as the operator has already received the necessary knowledge on the previous machines.

Usually one day’s punching is sufficient to familiarize the operator thoroughly with the automatic machines.

**Verifier Exercises**.—The last machine on which the operator is trained is the verifier. The operation of the machine is explained thoroughly, including instructions as to the handling of incorrectly punched cards to insure their being properly repunched. One operator should verify the cards punched by some other operator, for in this way the accuracy of both operators is tested.

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**Exercises for Alphabetic Punches**

The keyboard of alphabetic punches is designed to correspond in arrangement to that of a standard typewriter. Any person adept at typing will, therefore, find these machines extremely easy to operate.

The object of the three exercises provided here is to familiarize an operator with the use of any of the different types of alphabetic punches. However, certain parts of the information in the first exercise refer only to the use of the alphabetic printing punch.

Each line in Exercise I should be recorded in a separate card. When the alphabetic printing punch is being used, not only will such information be recorded in the card in the form of punched holes, but it will appear also in printed form along the top of the card.

The card forms in Exercises II and III should be studied before practice is begun. The figures to be punched, units, ten, hundreds, etc., are placed in the corresponding positions of a card field. If $1.10 is to be punched in a field of five columns, two zeros should be punched and then 110. The number and position of columns in each field should be noted. When the recording does not automatically place the card in position for recording in a subsequent field, the proper position may be obtained by spacing or tabular skipping. After the last field on the card has been punched, the card should be ejected to permit the next card to feed automatically into punching position.

In Exercise III the symbol "&" should be recorded by the use of the "X" key if the "12" key on the machine has not been replaced by that symbol.

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**EXERCISE I**

AT THE END OF EVERY LINE DEPRESS EJECT KEY WITH LITTLE FINGER OF YOUR RIGHT HAND  
DISREGARD PUNCTUATION IN YOUR TYPING HOWEVER FOR YOUR CONVENIENCE IN READING YOUR CARDS YOU MAY LEAVE 3 SPACES AT THE END OF A SENTENCE AND THE CUSTOMARY ONE SPACE BETWEEN WORDS  
LEAVE ONE SPACE IN WORDS CONTAINING AN APOSTROPHE SUCH AS O KEEFE  
NO SHIFT KEYS ARE NECESSARY SINCE ALL LETTERS ARE PRINTED ONLY AS CAPITALS

IN TYPING THESE INSTRUCTIONS YOU ARE LEARNING TO OPERATE THE ALPHABETIC PRINTING PUNCH THIS MACHINE IS USED TO PUNCH BOTH ALPHABETIC AND NUMERICAL DATA INTO A TABULATING CARD SO THAT COMPLETELY SPELLED NAMES DESCRIPTIVE WORDS AS WELL AS NUMBERS CAN SUBSEQUENTLY BE PRINTED BY AN ALPHABETIC ACCOUNTING MACHINE
IF YOU ARE ALREADY FAMILIAR WITH TYPEWRITING THE OPERATION OF THIS MACHINE WILL PROVE TO BE AMAZINGLY SIMPLE AND ENJOYABLE. YOU WILL OBSERVE HOW THE DEPRESSION OF A KEY CAUSES THE MACHINE TO PUNCH THE CARD AND SIMULTANEOUSLY PRINT THE CORRESPONDING LETTER OR FIGURE AT THE TOP OF THE CARD. THE PRINTING IS FOR YOUR CONVENIENCE IN READING, CHECKING, AND FILING THE INFORMATION JUST PUNCHED. THE PUNCHED HOLES ARE THE MEANS BY WHICH THIS INFORMATION WILL LATER BE INTERPRETED BY OTHER MACHINES.

NOTE THE EASE AND SPEED WITH WHICH EACH KEY IS DEPRESSED. THE ACTION OF ALL KEYS IS EXTREMELY LIGHT SINCE EVERY MOVEMENT IS POWER DRIVEN. THE KEYS SERVE MERELY TO ENGAGE THE OPERATING MECHANISMS. THE MACHINE MAY BE OPERATED AT A SPEED OF SIXTEEN KEY DEPRESSIONS PER SECOND A SPEED WELL ABOVE THAT REQUIRED BY THE FASTEST OPERATORS. AN AUTOMATIC LOCKING DEVICE PREVENTS ANY TWO KEYS FROM BEING DEPRESSED AT THE SAME TIME.

THE ALPHABET KEYS ARE ARRANGED IN STANDARD TYPEWRITER ORDER. THE FOLLOWING ADDITIONAL KEYS SERVE SPECIAL PURPOSES ON THIS MACHINE:

THE EJECT KEY CAUSES THE CARD IN THE MACHINE TO BE EJECTED AT ANY TIME AND FROM ANY DESIRED POSITION SIMULTANEOUSLY WITH THE FEEDING IN OF A NEW CARD.

BY DEPRESSING THE TAB KEY WITH THE LITTLE FINGER OF THE RIGHT HAND YOU CONTROL THE SKIPPING OF THE CARD TO THE PROPER COLUMNS TO BE PUNCHED.

THE COLON SEMICOLON KEY IS A DUMMY KEY WHOSE ONLY FUNCTION IS TO FACILITATE USE OF THE TOUCH SYSTEM. IT IS PROVIDED MERELY TO COMPLETE THE STANDARD TYPEWRITER KEYBOARD.

NEVER USE THE LETTER L FOR THE NUMBER 1. A ONE KEY IS PROVIDED FOR NUMERICAL PUNCHING. WHEN PUNCHING ZERO USE THE ZERO KEY IN THE TOP ROW.

THE 11 AND 12 KEYS LOCATED AT THE RIGHT OF THE LOWEST ROW OF KEYS PUNCH HOLES AT THE TOP OF THE CARD. THE 11 HOLE IS USED FOR CONTROLLING ADDITION OR SUBTRACTION AND ACTUATING CLASS SELECTION DEVICES ON OTHER MACHINES. THE 12 KEY PERMITS THE PRINTING OF ONE SPECIAL SYMBOL ON THE ALPHABETIC ACCOUNTING MACHINE.

AS PREVIOUSLY STATED, THERE IS NO PUNCTUATION OR CHARACTER OF ANY OTHER KIND ON THE KEYS 11 AND 12 EXCEPTED BECAUSE THIS TYPE OF SYMBOL IS UNNECESSARY ON THE OTHER MACHINES THAT WILL READ THESE PUNCHED CARDS.

A COLUMN INDICATOR IS PROVIDED DIRECTLY ABOVE THE RIBBON AS YOU PUNCH ACROSS THE CARD. THIS GUIDE INDICATES THE COLUMN ABOUT TO BE PUNCHED ON THE CARD.

A BACK SPACE LEVER IS PROVIDED AT THE RIGHT AND SLIGHTLY ABOVE THE TABULAR RACK. THE CARRIAGE MOVES BACKWARDS ONE SPACE WITH EACH DEPRESSION OF THE LEVER. BY KEEPING THE LEVER DEPRESSED THE CARRIAGE CAN BE MANUALLY MOVED BACKWARDS FOR SEVERAL SPACES.

THE TABULAR RACK AT THE TOP OF THE MACHINE ENABLES YOU TO SKIP TO A PREDETERMINED COLUMN OF THE CARD AT ANY TIME. THIS RACK CONTAINS 80 SLOTS CORRESPONDING TO THE 80 COLUMNS ON A CARD. TABULAR INSERTS ARE PLACED IN THE PROPER COLUMN SLOTS TO GOVERN COLUMN SKIPS. THE TABULAR INSERT IS ALWAYS PLACED IN THE COLUMN WHERE PUNCHING IS TO BEGIN. THESE INSERTS HAVE ON ONE SIDE A
Slightly raised flange when inserted uppermost this flange causes a bell to ring as the carriage passes the selected column position. Any number of tabular inserts may be placed on the rack; several are necessary for long skips since no more than 12 columns should be skipped at one time.

In case of an error resulting in an improperly punched column it would be advisable in most cases to eject the card tear it and then punch a new and correct card; however, if it is a dual card complicated and difficult to rewrite, an erasure of the printing can be made. The holes in error can be covered by court plaster squares and the card can be repunched in the same column that was in error. The first procedure is the more dependable since the sticker might come off in subsequent machine operations.

**Exercise II**

<table>
<thead>
<tr>
<th>EMP. NO.</th>
<th>DEPT.</th>
<th>FIRST NAME</th>
<th>SURNAME</th>
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<th>RATE</th>
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<td>Barton</td>
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<td>Robert</td>
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## EXERCISE III

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