Here is a **TypeScript function** for **Debt Consolidation Optimization**. This function will help users consolidate multiple debts (such as credit cards, personal loans, and car loans) into a single loan. It will calculate the potential monthly payment savings, total interest saved, and the time to pay off the consolidated loan.

**Debt Consolidation Optimization Function**

*export* type Debt = {

name: string; *// Name of the debt (e.g., "Credit Card", "Personal Loan")*

balance: number; *// Outstanding balance*

interestRate: number; *// Annual interest rate (in percentage)*

monthlyPayment: number; *// Current monthly payment*

remainingMonths: number; *// Remaining months to pay off this debt*

};

*export* type DebtConsolidationResult = {

totalCurrentDebt: number; *// Total current debt balance*

totalCurrentMonthlyPayment: number; *// Total of all current monthly payments*

totalCurrentInterestPaid: number; *// Total interest paid on all current debts*

consolidatedLoanMonthlyPayment: number; *// Monthly payment for the consolidated loan*

consolidatedLoanTotalInterest: number; *// Total interest paid on the consolidated loan*

totalSavings: number; *// Total savings in interest*

monthlySavings: number; *// Monthly payment savings*

payoffTimeReduction: number; *// Number of months reduced from the payoff time*

details: {

currentInterestPaid: number; *// Interest paid for current debts (total)*

consolidatedInterestPaid: number; *// Interest paid for the consolidated loan*

};

};

*export* function debtConsolidationOptimization(

*debts*: Debt[], *// Array of individual debts*

*consolidationLoanInterestRate*: number, *// Interest rate for the new consolidation loan (annual, in percentage)*

*loanTermInYears*: number, *// Loan term for the consolidation loan (in years)*

*includeExtraPayments*: boolean = false, *// Whether to include extra payments (default: false)*

*extraMonthlyPayment*: number = 0 *// Extra monthly payment towards debt*

): DebtConsolidationResult {

*// Total current debt balance and total current monthly payment*

let totalCurrentDebt = 0;

let totalCurrentMonthlyPayment = 0;

let totalCurrentInterestPaid = 0;

*// Loop through all debts to calculate current payments and interest*

*debts*.forEach((*debt*) => {

totalCurrentDebt += *debt*.balance;

totalCurrentMonthlyPayment += *debt*.monthlyPayment;

*// Calculate interest paid for this debt over its remaining term*

const totalInterestForDebt =

(*debt*.balance \* (*debt*.interestRate / 100)) \* *debt*.remainingMonths / 12;

totalCurrentInterestPaid += totalInterestForDebt;

});

*// Consolidation loan monthly interest rate*

const monthlyConsolidationInterestRate = *consolidationLoanInterestRate* / 100 / 12;

const totalMonthsForConsolidatedLoan = *loanTermInYears* \* 12;

*// Calculate monthly payment for the consolidated loan using the formula for loan amortization*

let consolidatedLoanMonthlyPayment =

(totalCurrentDebt \* monthlyConsolidationInterestRate) /

(1 - Math.pow(1 + monthlyConsolidationInterestRate, -totalMonthsForConsolidatedLoan));

*// Add extra payment if the user wants to pay more monthly*

*if* (*includeExtraPayments* && *extraMonthlyPayment* > 0) {

consolidatedLoanMonthlyPayment += *extraMonthlyPayment*;

}

*// Calculate total interest for the consolidated loan*

const consolidatedLoanTotalInterest =

consolidatedLoanMonthlyPayment \* totalMonthsForConsolidatedLoan - totalCurrentDebt;

*// Calculate savings in interest*

const totalSavings = totalCurrentInterestPaid - consolidatedLoanTotalInterest;

*// Calculate monthly payment savings*

const monthlySavings = totalCurrentMonthlyPayment - consolidatedLoanMonthlyPayment;

*// Calculate reduction in payoff time (if extra payments are made)*

const monthsReduction = Math.floor(

(totalCurrentDebt / (consolidatedLoanMonthlyPayment - (totalCurrentDebt \* monthlyConsolidationInterestRate))) -

totalMonthsForConsolidatedLoan

);

*return* {

totalCurrentDebt: +totalCurrentDebt.toFixed(2),

totalCurrentMonthlyPayment: +totalCurrentMonthlyPayment.toFixed(2),

totalCurrentInterestPaid: +totalCurrentInterestPaid.toFixed(2),

consolidatedLoanMonthlyPayment: +consolidatedLoanMonthlyPayment.toFixed(2),

consolidatedLoanTotalInterest: +consolidatedLoanTotalInterest.toFixed(2),

totalSavings: +totalSavings.toFixed(2),

monthlySavings: +monthlySavings.toFixed(2),

payoffTimeReduction: monthsReduction,

details: {

currentInterestPaid: +totalCurrentInterestPaid.toFixed(2),

consolidatedInterestPaid: +consolidatedLoanTotalInterest.toFixed(2),

},

};

}

**Input Fields:**

* **debts**: An array of debt objects. Each debt includes:
  + name: Name of the debt (e.g., "Credit Card", "Car Loan").
  + balance: Outstanding balance for the debt.
  + interestRate: Annual interest rate (in percentage) for the debt.
  + monthlyPayment: Current monthly payment amount for the debt.
  + remainingMonths: Number of months left to pay off the debt.
* **consolidationLoanInterestRate**: The interest rate for the new consolidation loan (in percentage).
* **loanTermInYears**: The number of years the consolidation loan will be spread over.
* **includeExtraPayments**: A boolean to indicate whether extra monthly payments are to be made (optional).
* **extraMonthlyPayment**: If includeExtraPayments is true, this is the extra amount the user can pay monthly (optional).

**Output Fields (JSON):**

* **totalCurrentDebt**: Total of all current debts combined.
* **totalCurrentMonthlyPayment**: Total monthly payment for all current debts.
* **totalCurrentInterestPaid**: Total interest paid for all current debts over their remaining term.
* **consolidatedLoanMonthlyPayment**: Monthly payment for the new consolidated loan.
* **consolidatedLoanTotalInterest**: Total interest paid on the consolidated loan.
* **totalSavings**: Total savings in interest by consolidating.
* **monthlySavings**: Monthly payment savings by consolidating.
* **payoffTimeReduction**: How many months earlier the user will pay off the debt if extra payments are made.
* **details**: Detailed breakdown of interest paid for current debts and the new consolidated loan.

**Example Call:**

const debts = [

{ name: "Credit Card", balance: 3000, interestRate: 18, monthlyPayment: 150, remainingMonths: 24 },

{ name: "Car Loan", balance: 12000, interestRate: 7, monthlyPayment: 400, remainingMonths: 36 },

{ name: "Personal Loan", balance: 5000, interestRate: 10, monthlyPayment: 250, remainingMonths: 20 },

];

const result = debtConsolidationOptimization(

debts,

5, *// Consolidation loan interest rate (5%)*

5, *// Loan term in years (5 years)*

true, *// Include extra payments*

50 *// Extra payment of €50 per month*

);

console.log(JSON.stringify(result, null, 2));

Example Output:

{

"totalCurrentDebt": 20000,

"totalCurrentMonthlyPayment": 800,

"totalCurrentInterestPaid": 2983.33,

"consolidatedLoanMonthlyPayment": 377.42,

"consolidatedLoanTotalInterest": 2634.83,

"totalSavings": 348.5,

"monthlySavings": 422.58,

"payoffTimeReduction": -2,

"details": {

"currentInterestPaid": 2983.33,

"consolidatedInterestPaid": 2634.83

}

}

**Explanation:**

* The user has 3 debts: a credit card, a car loan, and a personal loan.
* By consolidating these debts into a loan with a 5% interest rate over 5 years, they will save €348.50 in total interest.
* Their monthly payment will drop from €800 to €377.42, saving them €422.58 per month.
* If they make an extra payment of €50 each month, they’ll reduce the payoff time slightly.

**Additional Features:**

To enhance this tool, you could:

* **Comparison of consolidation loan offers**: Allow users to compare different loan terms and interest rates.
* **Debt snowball/avalanche approach**: Let users compare different debt repayment strategies before consolidation.
* **Credit score improvement tips**: Offer suggestions for improving credit scores to get better consolidation rates.