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ENHANCING BUSINESS FINANCIAL CALCULATIONS WITH PYTHON: A PRACTICAL APPROACH

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Abstract. *In the realm of business mathematics, Python can be an invaluable tool for solving various financial problems efficiently and accurately. This document presents a series of Python code examples that address common business math scenarios, including simple interest calculation, compound interest calculation, break-even analysis, present value of future cash flows, and depreciation using the straight-line method.*

Each problem is addressed with a corresponding Python function, complete with example usage to demonstrate practical applications. These examples illustrate how Python can streamline financial calculations, making complex business math problems more approachable and manageable.

Keywords: *Business Mathematics, Python Programming, Financial Calculations, Simple Interest, Compound Interest, Break-Even Analysis, Present Value, Future Cash Flows, Depreciation, Straight-Line Method, Financial Planning, Investment Analysis, Asset Management, Tax Planning, Economic Decision-Making.*

УЛУЧШЕНИЕ БИЗНЕС-ФИНАНСОВЫХ РАСЧЕТОВ С ПОМОЩЬЮ PYTHON: ПРАКТИЧЕСКИЙ ПОДХОД

Аннотация. *В области бизнес-математики Python может быть бесценным инструментом для эффективного и точного решения различных финансовых задач. В этом документе представлена серия примеров кода Python, которые рассматривают распространенные математические сценарии бизнеса, включая расчет простых процентов, расчет сложных процентов, анализ безубыточности, текущую стоимость будущих денежных потоков и амортизацию с использованием линейного метода.*

Каждая проблема решается с помощью соответствующей функции Python, дополненной примерами использования для демонстрации практического применения. Эти примеры иллюстрируют, как Python может упростить финансовые расчеты, делая сложные математические бизнес-задачи более доступными и управляемыми.

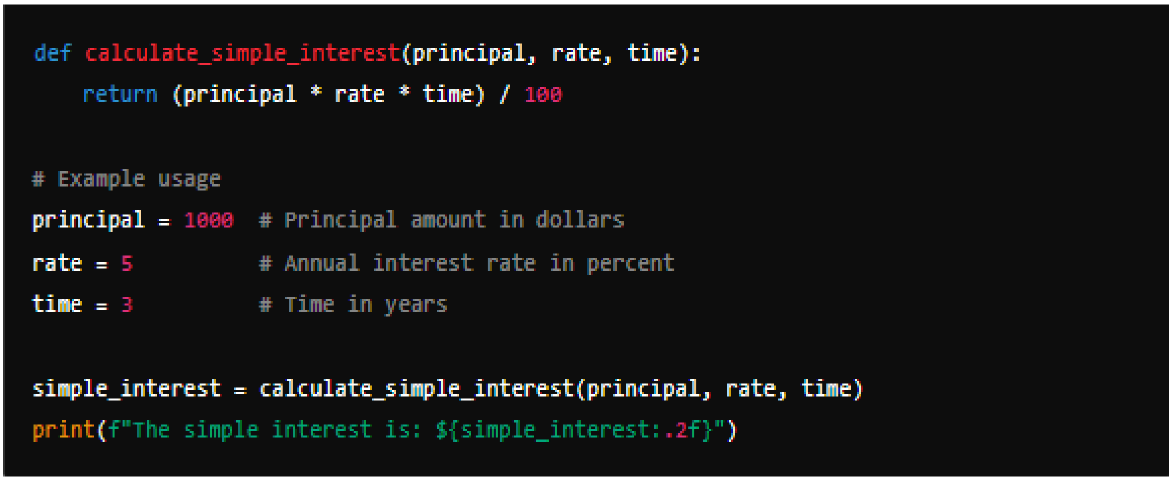
Ключевые слова: *бизнес-математика, программирование на Python, финансовые расчеты, простые проценты, сложные проценты, анализ безубыточности, текущая стоимость, будущие денежные потоки, амортизация, прямолинейный метод, финансовое планирование, инвестиционный анализ, управление активами, налоговое планирование, экономическое решение. -Изготовление.*

1. Simple Interest Calculation

Simple interest is calculated with the formula:

$$\text{Simple Interest} = \frac{P \times R \times T}{100}$$

where P is the principal amount, R is the rate of interest per year, and T is the time in years.



```
def calculate_simple_interest(principal, rate, time):
    return (principal * rate * time) / 100

# Example usage
principal = 1000  # Principal amount in dollars
rate = 5          # Annual interest rate in percent
time = 3          # Time in years

simple_interest = calculate_simple_interest(principal, rate, time)
print(f"The simple interest is: ${simple_interest:.2f}")
```

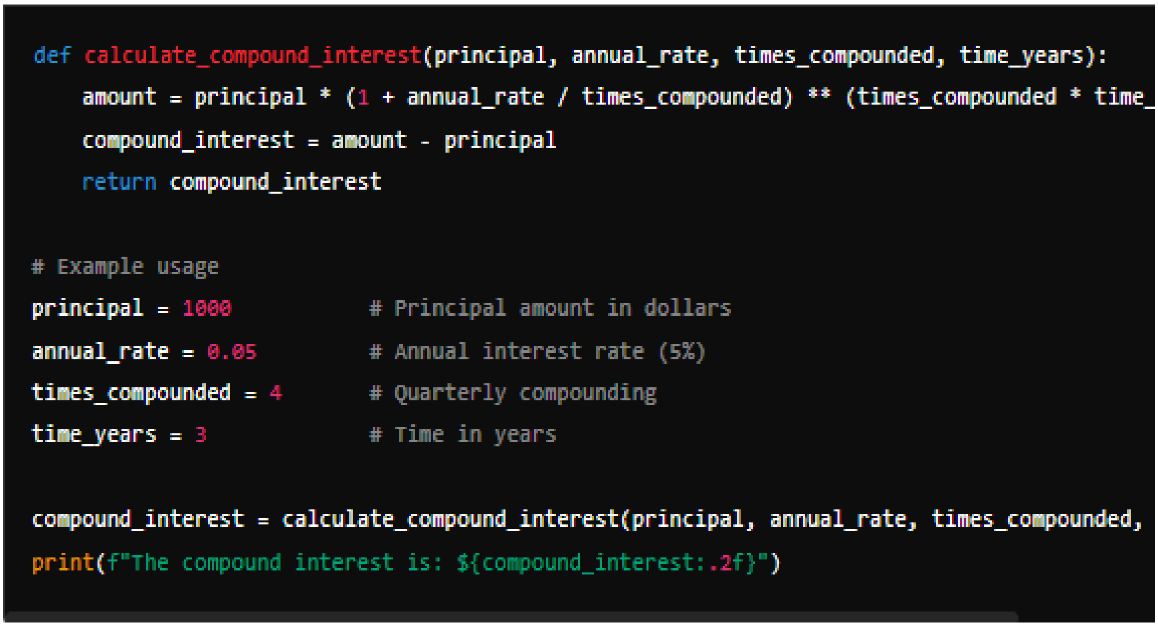
2. Compound Interest Calculation

Compound interest is calculated with the formula:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

where P is the principal amount, r is the annual interest rate (decimal), n is the number of times interest is compounded per year, and t is the time the money is invested for in years.

The compound interest is $A - P$.



```
def calculate_compound_interest(principal, annual_rate, times_compounded, time_years):
    amount = principal * (1 + annual_rate / times_compounded) ** (times_compounded * time_
    compound_interest = amount - principal
    return compound_interest

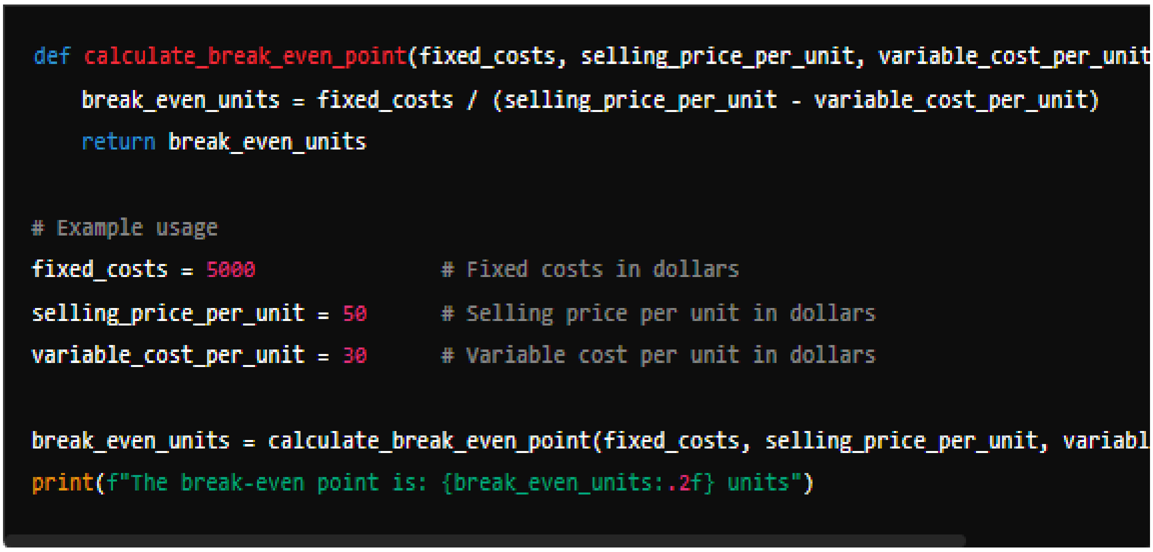
# Example usage
principal = 1000          # Principal amount in dollars
annual_rate = 0.05        # Annual interest rate (5%)
times_compounded = 4      # Quarterly compounding
time_years = 3            # Time in years

compound_interest = calculate_compound_interest(principal, annual_rate, times_compounded,
print(f"The compound interest is: ${compound_interest:.2f}")
```

3. Break-Even Analysis

Break-even point in units is calculated with the formula:

$$\text{Break-Even Point} = \frac{\text{Fixed Costs}}{\text{Selling Price per Unit} - \text{Variable Cost per Unit}}$$



```
def calculate_break_even_point(fixed_costs, selling_price_per_unit, variable_cost_per_unit
    break_even_units = fixed_costs / (selling_price_per_unit - variable_cost_per_unit)
    return break_even_units

# Example usage
fixed_costs = 5000                # Fixed costs in dollars
selling_price_per_unit = 50       # Selling price per unit in dollars
variable_cost_per_unit = 30       # Variable cost per unit in dollars

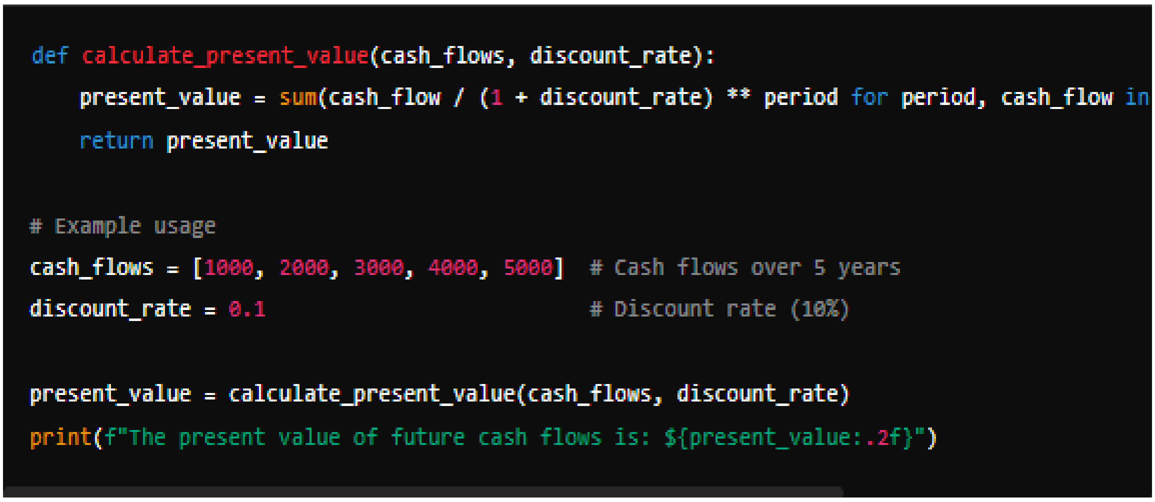
break_even_units = calculate_break_even_point(fixed_costs, selling_price_per_unit, variabl
print(f"The break-even point is: {break_even_units:.2f} units")
```

4. Present Value of Future Cash Flows

The present value (PV) of future cash flows is calculated with the formula:

$$PV = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t}$$

where C_t is the cash flow at time t, r is the discount rate, and n is the number of periods.



```
def calculate_present_value(cash_flows, discount_rate):
    present_value = sum(cash_flow / (1 + discount_rate) ** period for period, cash_flow in
    return present_value

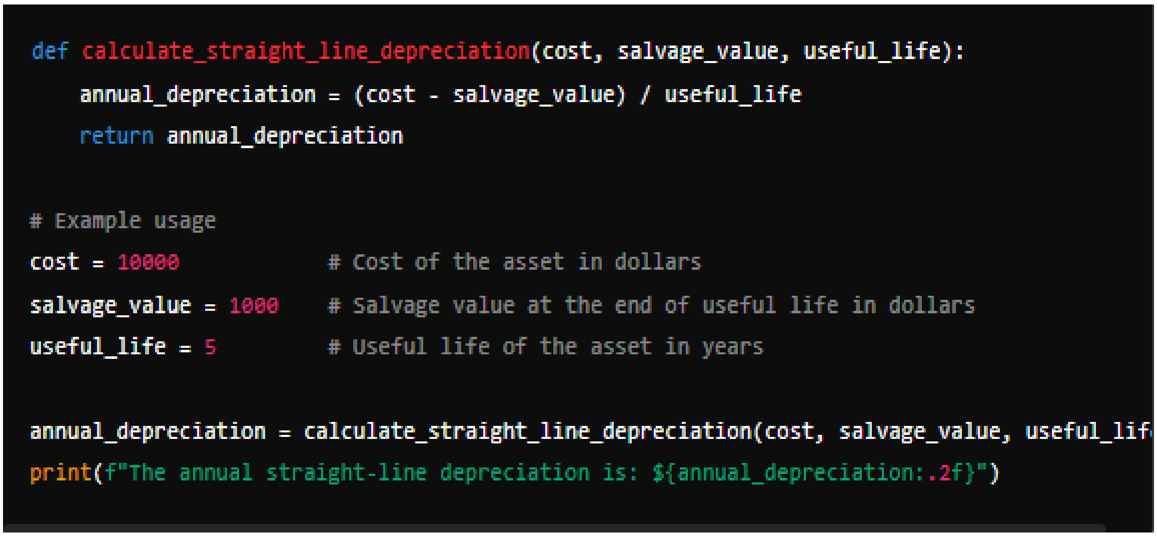
# Example usage
cash_flows = [1000, 2000, 3000, 4000, 5000]  # Cash flows over 5 years
discount_rate = 0.1                          # Discount rate (10%)

present_value = calculate_present_value(cash_flows, discount_rate)
print(f"The present value of future cash flows is: ${present_value:.2f}")
```

5. Depreciation Using Straight-Line Method

Straight-line depreciation is calculated with the formula:

$$\text{Annual Depreciation Expense} = \frac{\text{Cost} - \text{Salvage Value}}{\text{Useful Life}}$$



```
def calculate_straight_line_depreciation(cost, salvage_value, useful_life):
    annual_depreciation = (cost - salvage_value) / useful_life
    return annual_depreciation

# Example usage
cost = 10000            # Cost of the asset in dollars
salvage_value = 1000    # Salvage value at the end of useful life in dollars
useful_life = 5         # Useful life of the asset in years

annual_depreciation = calculate_straight_line_depreciation(cost, salvage_value, useful_lif
print(f"The annual straight-line depreciation is: ${annual_depreciation:.2f}")
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These are basic examples of business math problems and their implementations in Python. Feel free to modify the parameters and use the functions as needed for different scenarios.

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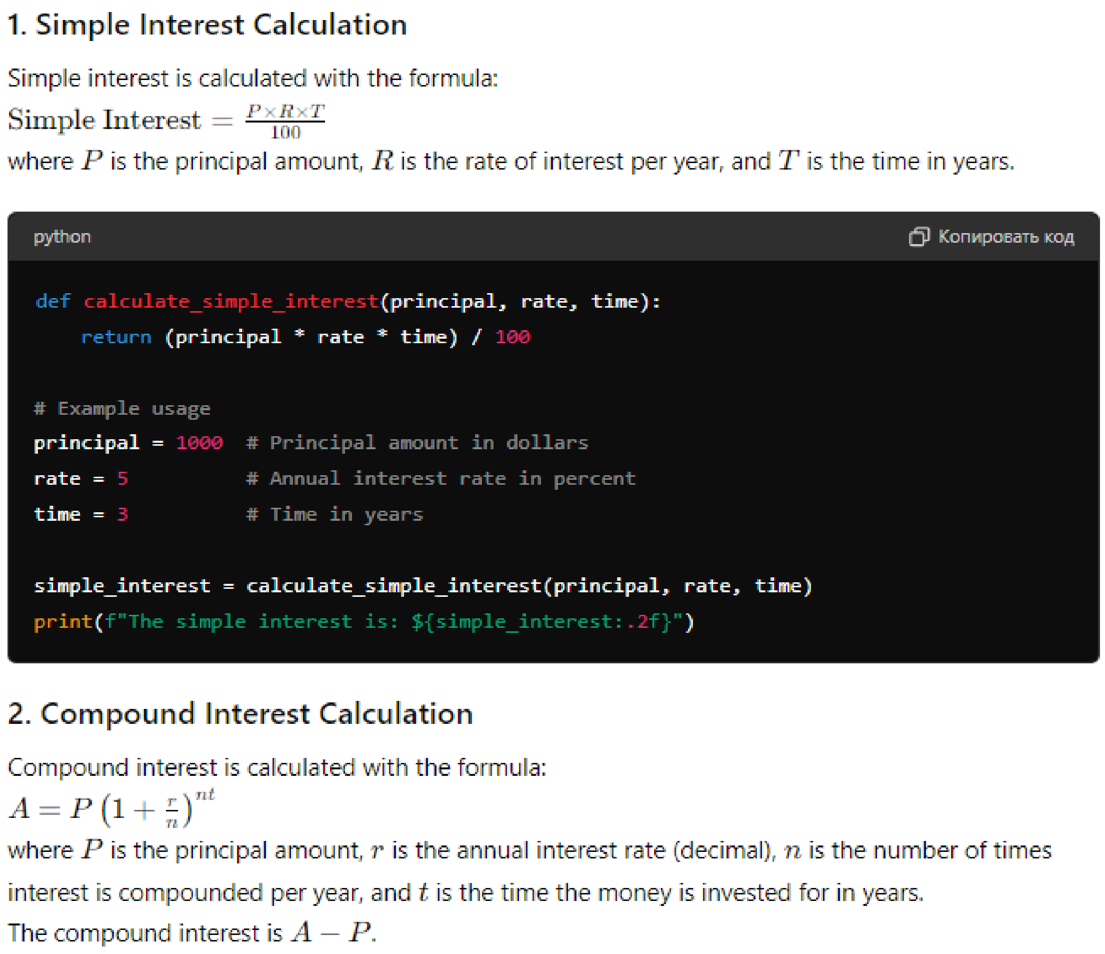

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python Копировать код

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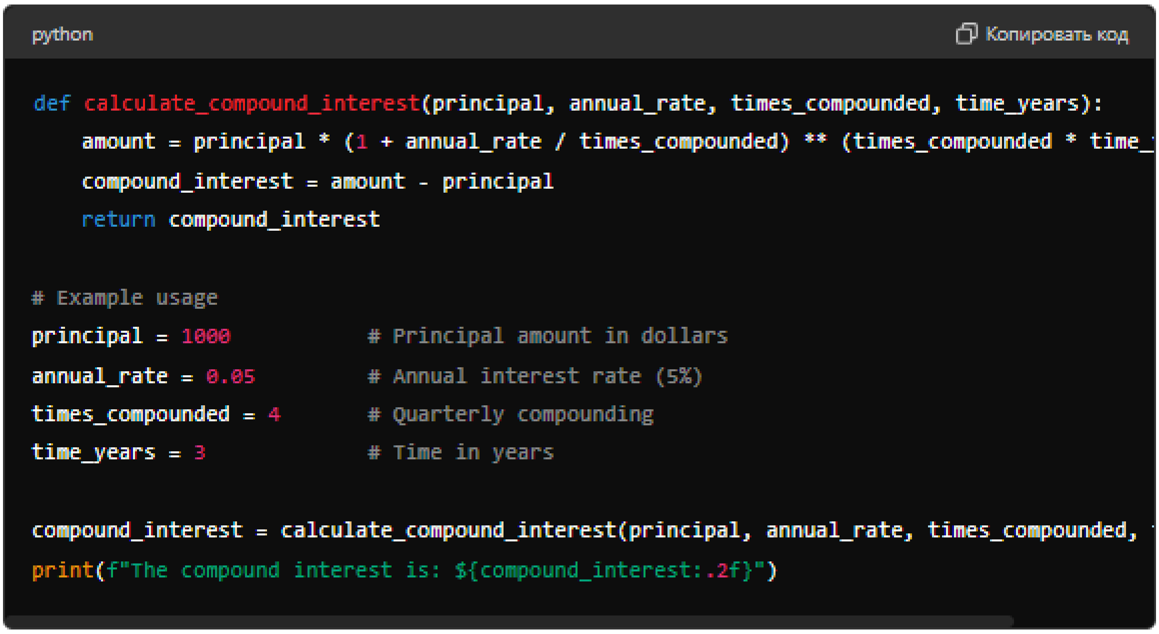

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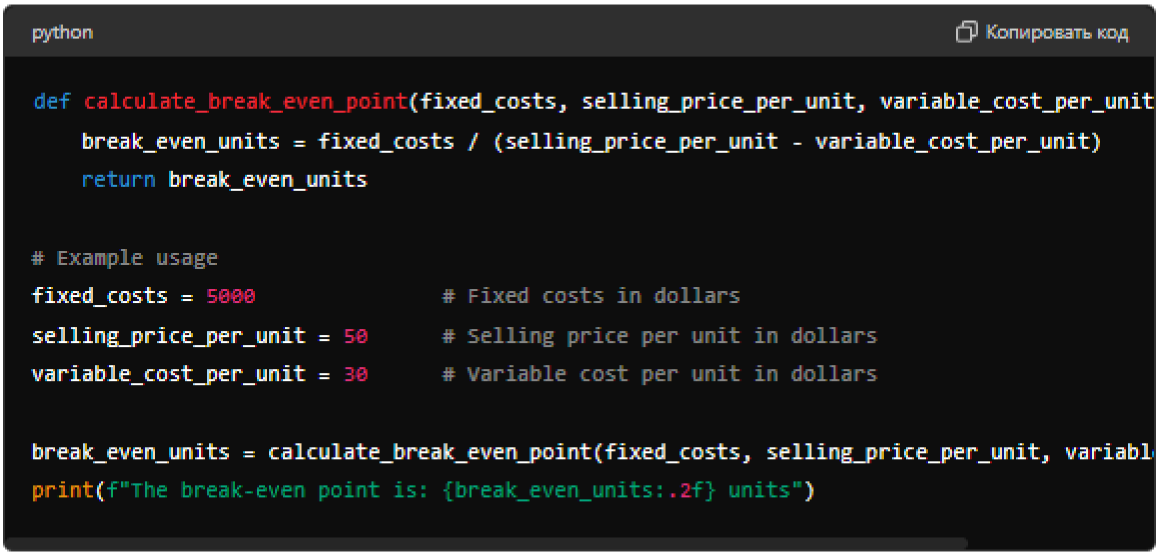

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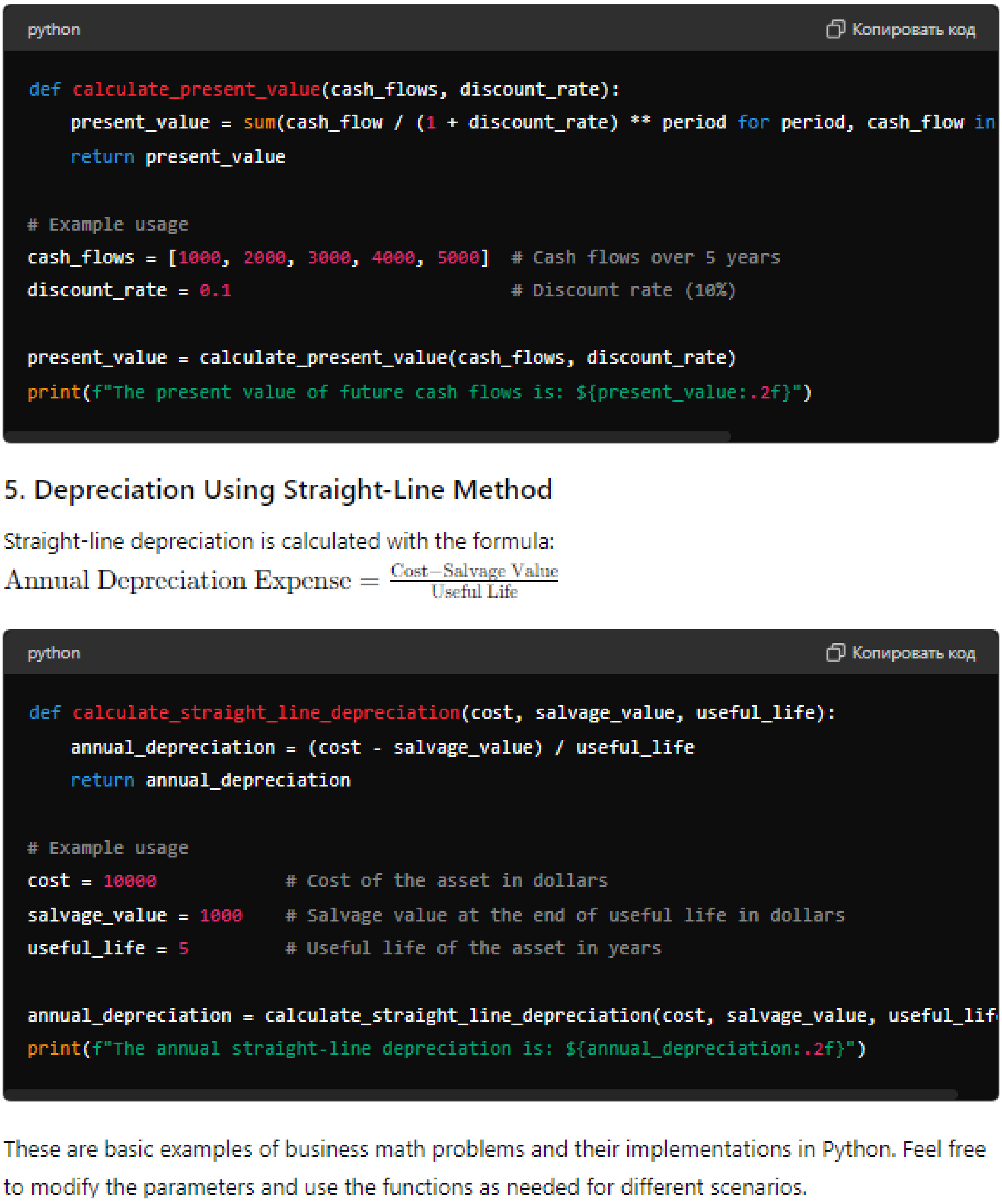

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