**ChatGPT and Teaching Accounting:**

**Threats and Opportunities**

11 August 2023

**What is ChatGPT?**

Here are answers from ChatGPT itself.

Question: What is ChatGPT?

ChatGPT: ChatGPT is a **large language model** developed by OpenAI. It is based on the GPT-3.5 architecture, which stands for "Generative Pre-trained Transformer 3.5." Language models like GPT-3.5 are designed to understand and generate human-like text based on the patterns and data they have been trained on.

Question: What is a large language model?

ChatGPT: A large language model is a type of artificial intelligence model designed to process and generate human language. It is called "large" because it has an extensive number of **parameters or trainable weights**, which allow it to capture complex patterns and relationships in language data. -- The size of a language model is often measured in terms of the number of parameters it contains. For instance, GPT-3.5 has 175 billion parameters, which makes it one of the largest language models developed to date (as of my knowledge cutoff in September 2021). These models are trained on vast amounts of text data from the internet to learn grammar, semantics, and context from the language.

Question: What is a parameter in a large language model?

ChatGPT: In a large language model, a parameter refers to a **numerical value** that the model learns during the training process. These values represent the model's "knowledge" and are adjusted during training to make the model better at its language-related tasks.

Question: Give an example of a parameter in GPT 3.5.

ChatGPT: For instance, one parameter might represent the strength of the connection between certain words, like **"apple" and "fruit,"** as the model learns that "apple" is often associated with the broader concept of "fruit." Another parameter could capture information about **subject-verb agreement**, allowing the model to produce grammatically correct sentences. Yet another parameter might store **context information**, enabling the model to consider the preceding words in a sentence to generate appropriate responses.

Question: What is a **chatbot**?

ChatGPT: A chatbot is a computer program or an artificial intelligence (AI) application designed to simulate a conversation with human users through natural language processing. Chatbots are also known as conversational agents or virtual assistants. They are commonly used to interact with users and provide information, answer questions, offer customer support, or assist with various tasks.

**What are people saying about ChatGPT?**

This article provides an excellent summary.

***MIT Technology Review***

ChatGPT is about to revolutionize the economy. We need to decide what that looks like.

* New large language models will transform many jobs. Whether they will lead to widespread prosperity or not is up to us.

By David Rotman

March 25, 2023

https://www.technologyreview.com/2023/03/25/1070275/chatgpt-revolutionize-economy-decide-what-looks-like/

**How Does a Person Get a ChatGPT Account?**

This article leads you through the steps. All you need is an email address and a phone number. For now, access to ChatGPT is FREE!!

https://www.zdnet.com/article/how-to-use-chatgpt/

1. Go to chat.openai.com and log in or register [need email address and phone number]

2. Accept the disclaimers from ChatGPT

3. Learn how to use ChatGPT

4. Start writing your prompts and questions

**Examples of ACCOUNTING questions that ChatGPT Gets Correct and Incorrect**

**Problems with Dates**

On **January 1** of Year 1, Tooele Company borrowed $100,000. The annual interest rate on the loan is 12%. What is Tooele Company’s interest expense for Year 1?

**Correct = $12,000**

**ChatGPT Response:**

**To calculate Tooele Company's interest expense for Year 1, we need to consider the time period for which the company borrowed the money. Since the company borrowed the money on January 1 of Year 1, we need to calculate the interest expense for the full year.**

**Let's break down the calculation:**

**Calculate the interest amount for the loan for one year:**

**Interest Amount = Principal × Rate**

**Interest Amount = $100,000 × 0.12**

**Interest Amount = $12,000**

**So, Tooele Company's interest expense for Year 1 is $12,000. This is the amount the company will have to pay as interest for the entire year on the borrowed $100,000 at an annual interest rate of 12%.**

On **March 1** of Year 1, Tooele Company borrowed $100,000. The annual interest rate on the loan is 12%. What is Tooele Company’s interest expense for Year 1?

**Incorrect. Answered $1,014.38. Correct answer is $10,000.**

**ChatGPT Response:**

**To calculate Tooele Company's interest expense for Year 1, we need to consider that the loan was taken on March 1 of Year 1. Therefore, the company would have borrowed the money for a partial year, not the entire year.**

**To calculate the interest expense, we'll use the formula for simple interest:**

**Interest Expense = Principal \* Interest Rate \* Time**

**where:**

**Principal = $100,000 (the amount borrowed)**

**Interest Rate = 12% per annum (as a decimal, so 12% becomes 0.12)**

**Time = the portion of the year the loan was outstanding**

**Since the loan was taken on March 1, there are 31 days in March, and the year has a total of 365 days (or 366 in a leap year). So, the time period for which the loan was outstanding is 31/365 (or 31/366 in a leap year) of a year.**

**Let's calculate the interest expense:**

**Interest Expense = $100,000 \* 0.12 \* (31/365)**

**Interest Expense ≈ $100,000 \* 0.12 \* 0.08493150684931507 ≈ $1,014.38 (rounded to two decimal places)**

**So, Tooele Company's interest expense for Year 1, considering the loan was taken on March 1, is approximately $1,014.38.**

On **September 1** of Year 1, Tooele Company borrowed $100,000. The annual interest rate on the loan is 12%. What is Tooele Company’s interest expense for Year 1?

**Incorrect. Answered $3,000. Correct answer is $4,000.**

**ChatGPT Response:**

**To calculate Tooele Company's interest expense for Year 1, we need to consider the time period for which the company borrowed the money. Since the company borrowed the money on September 1 of Year 1, we need to calculate the interest expense for the remaining months in Year 1.**

**Let's break down the calculation:**

**Calculate the number of months remaining in Year 1 after September 1:**

**Months remaining = 12 (total months in a year) - 9 (September to December) = 3 months.**

**Calculate the monthly interest rate:**

**Monthly interest rate = Annual interest rate / 12**

**Monthly interest rate = 12% / 12 = 1% or 0.01.**

**Calculate the interest expense for the remaining 3 months of Year 1:**

**Interest Expense = Principal × Monthly interest rate × Months remaining**

**Interest Expense = $100,000 × 0.01 × 3**

**Interest Expense = $100,000 × 0.03**

**Interest Expense = $3,000.**

**Problems with Classification and Arithmetic**

 Use the following information to compute NET INCOME. The income tax rate is 40%.

 Cost of Goods Sold $ 3,000

 Interest Expense 1,100

 Selling and Administrative Expense 1,750

 Sales 10,000

 Dividends 700

Note: Income tax expense is 40 percent of income before taxes.

**Correct answer**

 **Sales $10,000**

 **Cost of Goods Sold 3,000**

 **Gross Profit $ 7,000**

 **Less: Selling and Administrative Expense 1,750**

 **Operating Income $ 5,250**

 **Interest Expense 1,100**

 **Income Before Income Taxes $4,150**

 **Income Tax Expense (40%) 1,660**

 **Net Income $2,490**

**ChatGPT Attempt #1 – Incorrect = $2,790 Mistake? Wrong arithmetic AND subtracted Dividends**

To compute NET INCOME, we need to calculate the income before taxes first and then deduct the income tax expense.

Step 1: Calculate Income Before Taxes Income Before Taxes = Sales - Cost of Goods Sold - Interest Expense - Selling and Administrative Expense Income Before Taxes = $10,000 - $3,000 - $1,100 - $1,750 Income Before Taxes = $4,150

Step 2: Calculate Income Tax Expense Income Tax Expense = 40% of Income Before Taxes Income Tax Expense = 0.40 \* $4,150 Income Tax Expense = $1,660

Step 3: Calculate Net Income Net Income = Income Before Taxes - Income Tax Expense - Dividends Net Income = $4,150 - $1,660 - $700 Net Income = $2,790

Therefore, the Net Income is $2,790.

**ChatGPT Attempt #2 -- Incorrect = $2,670 Mistake? Different wrong arithmetic AND subtracted Dividends**

To compute NET INCOME, we need to follow these steps:

1. Calculate the company's income before taxes (Income Before Taxes = Sales - Cost of Goods Sold - Selling and Administrative Expense - Interest Expense - Dividends).
2. Calculate the income tax expense (Income Tax Expense = 40% of Income Before Taxes).
3. Compute the Net Income (Net Income = Income Before Taxes - Income Tax Expense).

Given the information:

Cost of Goods Sold: $3,000 Interest Expense: $1,100 Selling and Administrative Expense: $1,750 Sales: $10,000 Dividends: $700 Income tax rate: 40% (0.40)

Let's calculate Net Income:

Step 1: Calculate Income Before Taxes Income Before Taxes = Sales - Cost of Goods Sold - Selling and Administrative Expense - Interest Expense - Dividends Income Before Taxes = $10,000 - $3,000 - $1,750 - $1,100 - $700 Income Before Taxes = $4,450

Step 2: Calculate Income Tax Expense Income Tax Expense = 40% of Income Before Taxes Income Tax Expense = 0.40 \* $4,450 Income Tax Expense = $1,780

Step 3: Compute Net Income Net Income = Income Before Taxes - Income Tax Expense Net Income = $4,450 - $1,780 Net Income = $2,670

Therefore, the Net Income is $2,670.

**ChatGPT Attempt #3 -- Correct = $2,490**

To compute the NET INCOME, we need to follow these steps:

1. Calculate the gross profit.
2. Subtract selling and administrative expenses from the gross profit to get the operating income.
3. Subtract interest expense from the operating income to get income before taxes.
4. Calculate income tax expense, which is 40% of income before taxes.
5. Subtract income tax expense from income before taxes to obtain the NET INCOME.

Given the information:

Cost of Goods Sold: $3,000 Interest Expense: $1,100 Selling and Administrative Expense: $1,750 Sales: $10,000 Dividends: $700 Income Tax Rate: 40%

Let's proceed with the calculations:

1. Calculate the gross profit: Gross Profit = Sales - Cost of Goods Sold Gross Profit = $10,000 - $3,000 Gross Profit = $7,000
2. Calculate the operating income: Operating Income = Gross Profit - Selling and Administrative Expense Operating Income = $7,000 - $1,750 Operating Income = $5,250
3. Calculate income before taxes: Income Before Taxes = Operating Income - Interest Expense Income Before Taxes = $5,250 - $1,100 Income Before Taxes = $4,150
4. Calculate income tax expense: Income Tax Expense = 40% of Income Before Taxes Income Tax Expense = 0.40 \* $4,150 Income Tax Expense = $1,660
5. Calculate Net Income: Net Income = Income Before Taxes - Income Tax Expense Net Income = $4,150 - $1,660 Net Income = $2,490

Therefore, the NET INCOME is $2,490.

**ChatGPT Attempt #4 -- Incorrect = $2,790 Mistake? Same mistakes as #1**

To compute the NET INCOME, we need to follow these steps:

1. Calculate the Gross Profit: Gross Profit = Sales - Cost of Goods Sold
2. Calculate the Income Before Taxes: Income Before Taxes = Gross Profit - Selling and Administrative Expense - Interest Expense
3. Calculate the Income Tax Expense: Income Tax Expense = Income Before Taxes \* Income Tax Rate (40%)
4. Calculate the Net Income: Net Income = Income Before Taxes - Income Tax Expense - Dividends

Given the information:

Cost of Goods Sold: $3,000 Interest Expense: $1,100 Selling and Administrative Expense: $1,750 Sales: $10,000 Dividends: $700 Income Tax Rate: 40% (0.40)

Now, let's perform the calculations:

1. Gross Profit = Sales - Cost of Goods Sold Gross Profit = $10,000 - $3,000 Gross Profit = $7,000
2. Income Before Taxes = Gross Profit - Selling and Administrative Expense - Interest Expense Income Before Taxes = $7,000 - $1,750 - $1,100 Income Before Taxes = $4,150
3. Income Tax Expense = Income Before Taxes \* Income Tax Rate Income Tax Expense = $4,150 \* 0.40 Income Tax Expense = $1,660
4. Net Income = Income Before Taxes - Income Tax Expense - Dividends Net Income = $4,150 - $1,660 - $700 Net Income = $2,790

Therefore, the Net Income is $2,790.

**ChatGPT Attempt #5 – Incorrect = $1,790 Mistake? Correct arithmetic but subtracted Dividends (no taxes)**

To compute Net Income, we need to follow these steps:

1. Calculate Income Before Taxes.
2. Calculate Income Tax Expense.
3. Compute Net Income.

Given the information:

Cost of Goods Sold: $3,000 Interest Expense: $1,100 Selling and Administrative Expense: $1,750 Sales: $10,000 Dividends: $700 Income Tax Rate: 40%

Step 1: Calculate Income Before Taxes

Income Before Taxes = Sales - Cost of Goods Sold - Interest Expense - Selling and Administrative Expense Income Before Taxes = $10,000 - $3,000 - $1,100 - $1,750 Income Before Taxes = $4,150

Step 2: Calculate Income Tax Expense

Income Tax Expense = Income Before Taxes \* Income Tax Rate Income Tax Expense = $4,150 \* 40% = $1,660

Step 3: Compute Net Income

Net Income = Income Before Taxes - Income Tax Expense - Dividends Net Income = $4,150 - $1,660 - $700 Net Income = $1,790

Therefore, the Net Income is $1,790.

**ChatGPT Attempt #6 -- Incorrect = $2,070 Mistake? Included Dividends as a tax-deductible expense**

To compute NET INCOME, we need to follow these steps:

1. Calculate the Gross Profit: Gross Profit = Sales - Cost of Goods Sold
2. Calculate the Operating Income: Operating Income = Gross Profit - Selling and Administrative Expense - Interest Expense
3. Calculate the Income Before Taxes: Income Before Taxes = Operating Income - Dividends
4. Calculate the Income Tax Expense: Income Tax Expense = 40% of Income Before Taxes
5. Compute Net Income: Net Income = Income Before Taxes - Income Tax Expense

Given the information:

Sales = $10,000 Cost of Goods Sold = $3,000 Interest Expense = $1,100 Selling and Administrative Expense = $1,750 Dividends = $700 Income Tax Rate = 40% (0.40)

Now, let's calculate the figures step by step:

1. Gross Profit = Sales - Cost of Goods Sold Gross Profit = $10,000 - $3,000 Gross Profit = $7,000
2. Operating Income = Gross Profit - Selling and Administrative Expense - Interest Expense Operating Income = $7,000 - $1,750 - $1,100 Operating Income = $4,150
3. Income Before Taxes = Operating Income - Dividends Income Before Taxes = $4,150 - $700 Income Before Taxes = $3,450
4. Income Tax Expense = 40% of Income Before Taxes Income Tax Expense = 0.40 \* $3,450 Income Tax Expense = $1,380
5. Net Income = Income Before Taxes - Income Tax Expense Net Income = $3,450 - $1,380 Net Income = $2,070

Therefore, the Net Income is $2,070.

**LOTS of Problems**

**with Time Value of Money Calculations**

**IRR**

A business project requires the initial outlay of $200,000 in cash. The project will generate cash inflows of $30,000 at the end of each year for the next 11 years. What is the internal rate of return of this project?

**Correct Answer - Using an HP Calculator:**

**1. -200,000: Press PV**

**2. 30,000: Press PMT**

**3. 11: Press N**

**4. Press I for the answer**

**Answer is 9.4%**

**ChatGPT Attempt #1 -- Incorrect = No answer!! ChatGPT can’t solve it at all; just sets it up.**

**To calculate the internal rate of return (IRR) of the project, we need to find the discount rate at which the net present value (NPV) of the cash flows is equal to zero. In other words, we need to find the rate at which the present value of the cash inflows equals the initial outlay.**

**The formula for NPV is as follows:**

**NPV = Σ(CF\_t / (1 + r)^t) - Initial Outlay**

**Where:**

**CF\_t = Cash flow at time t**

**r = Discount rate (the IRR we are trying to find)**

**t = Time period**

**Given information:**

**Initial outlay (Initial investment) = $200,000**

**Cash inflow (CF) per year = $30,000**

**Number of years (n) = 11**

**Now, we need to solve for the discount rate (IRR) that makes the NPV equal to zero. Let's set up the equation:**

**0 = Σ($30,000 / (1 + r)^t) - $200,000**

**Now, we'll plug in the values for each year (t = 1 to 11) and solve for r (IRR):**

**0 = $30,000 / (1 + r)^1 + $30,000 / (1 + r)^2 + ... + $30,000 / (1 + r)^11 - $200,000**

**Since this is a complex equation to solve manually, we can use numerical methods or financial software/tools to find the IRR. Most spreadsheet software like Microsoft Excel or Google Sheets has built-in functions to calculate IRR.**

**In Excel, you can use the IRR function:**

**=IRR(range of cash flows)**

**Assuming the cash inflows are listed in cells A1 to A11, you can use the following formula in Excel:**

**=IRR(A1:A11)**

**The result would be the internal rate of return for the project.**

**ChatGPT Attempt #2 -- Incorrect = 6.62% ChatGPT describes the correct process but then confidently gives an answer that is wrong.**

**To calculate the internal rate of return (IRR) of the project, we need to find the discount rate at which the present value of cash inflows equals the initial outlay.**

**Let's break down the calculation step by step:**

**Define the cash inflows and outflow:**

**Initial Outlay (negative): -$200,000**

**Cash inflows (positive): $30,000 per year for 11 years**

**Calculate the present value (PV) of cash inflows at different discount rates:**

**We will calculate the present value of cash inflows at various discount rates until we find the rate at which the sum of present values equals the initial outlay.**

**Using a financial calculator or spreadsheet software, we can find that the internal rate of return (IRR) of the project is approximately 6.62%.**

**The IRR is the discount rate that makes the present value of cash inflows equal to the initial outlay. In this case, the IRR is approximately 6.62%, which means that the project's cash inflows are expected to generate an internal rate of return of around 6.62% over the 11-year period. If the IRR is higher than the company's cost of capital or desired rate of return, the project is considered financially feasible and attractive.**

**NPV**

A business project requires the initial outlay of $200,000 in cash. The project will generate cash inflows of $30,000 at the end of each year for the next 11 years. The appropriate discount rate is 10.0%. What is the NET PRESENT VALUE of this project?

**Correct Answer - Using an HP Calculator:**

**1. 0: Press FV**

**2. 30,000: Press PMT**

**3. 11: Press N**

**4. 10: Press I**

**5. Press PV for the answer**

**Present value of cash inflows is $194,852.**

**NPV = -$200,000 + $194,852 = -$5,148**

**ChatGPT Attempt #1 -- Incorrect = positive $5,860. ChatGPT describes the correct process but then confidently gives an answer that is wrong.**

**To calculate the Net Present Value (NPV) of the project, we need to find the present value of each cash inflow and then subtract the initial outlay from the sum of the present values. The formula for calculating NPV is as follows:**

**NPV = Σ(CF\_t / (1 + r)^t) - Initial Outlay**

**Where:**

**CF\_t = Cash flow at time t**

**r = Discount rate (in decimal form)**

**t = Time period**

**Given information:**

**Initial outlay (Initial investment) = $200,000**

**Cash inflow (CF) per year = $30,000**

**Number of years (n) = 11**

**Discount rate (r) = 10.0% = 0.10**

**Now, let's calculate the NPV:**

**NPV = Σ($30,000 / (1 + 0.10)^t) - $200,000**

**NPV = ($30,000 / (1.10)^1) + ($30,000 / (1.10)^2) + ... + ($30,000 / (1.10)^11) - $200,000**

**To simplify the calculation, we can use the geometric sum formula for the present value of an annuity:**

**Present Value of an Annuity = CF \* [(1 - (1 + r)^(-n)) / r]**

**Using this formula, we can calculate the NPV:**

**NPV = $30,000 \* [(1 - (1 + 0.10)^(-11)) / 0.10] - $200,000**

**NPV = $30,000 \* [(1 - 0.3138) / 0.10] - $200,000**

**NPV = $30,000 \* [0.6862 / 0.10] - $200,000**

**NPV = $30,000 \* 6.862 - $200,000**

**NPV = $205,860 - $200,000**

**NPV = $5,860**

**The Net Present Value (NPV) of this project is $5,860. Since the NPV is positive, this indicates that the project is expected to generate a positive return after accounting for the initial investment and the appropriate discount rate.**

Tried this 4 more times

**ChatGPT Attempt #2 -- Incorrect** Negative $194,723 – incorrectly used Excel NPV function

**ChatGPT Attempt #3 -- Incorrect** Negative $62,231 – again incorrectly used Excel NPV function

**ChatGPT Attempt #4 -- Incorrect** Negative $95,722 – incorrectly computed present value of annuity

* Even though the SETUP was correct

**ChatGPT Attempt #5 -- Incorrect** Negative $22,891 – incorrectly computed present value of annuity

* Even though the SETUP was correct

**NPV with Income Taxes**

A machine costs $200,000 in cash. The machine will generate before-tax cash inflows of $30,000 at the end of each year for the next 10 years. The machine is depreciated, for tax purposes, over 10 years with zero salvage value. The income tax rate is 30%. The appropriate discount rate is 10.0%. What is the NET PRESENT VALUE of this machine?

**Correct Answer - Using an HP Calculator:**

**1. 0: Press FV**

**2. 27,000: Press PMT**

**3. 10: Press N**

**4. 10: Press I**

**5. Press PV for the answer**

**Present value of cash inflows is $165,903.**

**NPV = -$200,000 + $165,903 = -$34,097**

**ChatGPT Attempt #1 -- Incorrect = Negative $151,691 – didn’t know depreciation is a non-cash expense. Confidently gives an answer that is wrong.**

**To calculate the Net Present Value (NPV) of the machine with depreciation and income tax considerations, we need to adjust the cash inflows for taxes and depreciation, and then discount them back to the present value. We'll also subtract the initial cash outlay.**

**Given:**

**Initial cash outlay for the machine = $200,000**

**Before-tax Cash inflows (CFt) = $30,000 for each year from t=1 to t=10**

**Depreciation period = 10 years**

**Salvage value = $0 (no salvage value)**

**Income tax rate = 30% or 0.30**

**Discount rate (r) = 10% or 0.10**

**Step 1: Calculate the annual depreciation expense (D) for tax purposes**

**Since the machine is depreciated over 10 years with no salvage value, the annual depreciation expense is constant.**

**Annual depreciation expense (D) = Initial cash outlay / Depreciation period**

**D = $200,000 / 10**

**D = $20,000**

**Step 2: Calculate the after-tax cash inflows (ATCFt)**

**After-tax Cash inflows (ATCFt) = (Before-tax Cash inflows - Depreciation) \* (1 - Income tax rate)**

**ATCFt = ($30,000 - $20,000) \* (1 - 0.30)**

**ATCFt = $10,000 \* 0.70**

**ATCFt = $7,000**

**Step 3: Calculate NPV with after-tax cash inflows**

**NPV = Σ(ATCFt / (1 + r)^t) - Initial cash outlay**

**Where the sum Σ is taken from t=1 to t=10, since there are 10 years of cash inflows.**

**NPV = [($7,000 / (1 + 0.10)^1) + ($7,000 / (1 + 0.10)^2) + ... + ($7,000 / (1 + 0.10)^10)] - $200,000**

**Using a financial calculator or spreadsheet software, you can calculate the NPV as follows:**

**NPV = [$7,000 / (1 + 0.10)^1 + $7,000 / (1 + 0.10)^2 + ... + $7,000 / (1 + 0.10)^10] - $200,000**

**NPV ≈ [$6,363.64 + $5,785.23 + ... + $2,218.68] - $200,000**

**NPV ≈ $48,309.45 - $200,000**

**NPV ≈ -$151,690.55**

**The NPV of the machine is approximately -$151,690.55. Since the NPV is negative, it suggests that the machine may not be a good investment opportunity, assuming the 10.0% discount rate, 30% income tax rate, and 10-year depreciation period with no salvage value are the appropriate parameters for this investment. A positive NPV would indicate a profitable investment, while a negative NPV suggests a loss.**

Tried this 3 more times

**ChatGPT Attempt #2 – Incorrect Negative $152,146 – same as above + different (also incorrect) math**

**ChatGPT Attempt #3 -- Incorrect Positive $11,547 – correct after-tax cash flows BUT incorrect math**

* **Even though the SETUP was correct**

**ChatGPT Attempt #4 -- Incorrect Negative $22,800 – same as above but different incorrect math**

* **Even though the SETUP was correct**