Applying Rational Functions
Mid Unit Assignment

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Abstract
This report discusses the application of rational functions in the economic sector. The report describes the role of accountants, their salaries, the way to become the job, and how they can use rational function in their role. In addition, there is a rational application to determine the x and y intercepts, asymptotes, holes, maximum and minimum values, intervals, domains and ranges, and graphs of established functions.

Introduction
Accountants manage the books and prepare financial documents such as income statements, balance sheets. It conducts book audits, prepares reports for tax purposes, and handles all financial information necessary to operate the business. An accountant creates all the reports necessary to make the right financial decisions for the business. They give financially necessary help to those who run the enterprise.

On a regular basis, Accountants review corporate processes, dynamics, risks, earnings, financial responsibilities and responsibilities for projecting or providing guidance on potential sales and expenditures. They help the management team to comply with regulation and ensure compliance with payment. The typical daily workload of accountants includes the following.

To begin with, accountants issue an invoice. The company must charge the customer and collect the charges from the customer. Accountants can make bills and send them to customers so that companies can receive money. Secondly, accountants record sales transparently. In order for a business to succeed, we need to know how much our products are actually sold and how much we benefit from the cost. By writing a report, an accountant answers these financial questions, which will show you what products to phase out and how much inventory one will need next month. Accountants also manage and pay invoices from suppliers, which helps the management team to track costs to see how profitable their business is.

In addition, accountants manage employees' salaries. The accountant tracks and calculates how many hours your employees worked last month and how much they were paid in return. Accountants can track sales figures. Lastly but not least, accountants can keep you updated on tax laws and changes. Accountants can help you comply with tax laws by calculating employee payroll taxes and informing management of changes in sales tax for each product.

To note, there are differences between (public) accountants and certified accountants (having CPA certificate). (Public) accountants are typically individuals employed to work in the accounting department of a company by performing some limited tasks including preparation of financial statements but they lack qualifications as a certified public accountant. In contrast, certified public accounts can serve all the tasks that public accounts can do but additionally are able to audit tasks, review statements and represent clients before going to IRS - Internal Revenue Service of the nation.
Although public accounts can arrange for a tax return after passing the tests required from the IRS, the certified accountants are more welcome in the field since they have met a variety of

specific requirements, such as earning a college degree, working for number of hours - usually 1800 hours - under the supervision of a senior chartered accountant. (Miller)

To become an certified accountant in Canada, the aspirant is recommended to apply for business school after finishing their high school. There are many Canadian schools that provide courses including taxation, accounting theory and procedures that teach students to learn the rudimentary of accounting. Although securing the accounting or related business degree is not mandatory, it is alleged that majoring related majors is widely considered as the minimum educational requirement for those who are planning to apply for CPA - Certified Public Accountant - which is widely considered a certificate for those who are working as an accountant.

There are four parts in CPA exam - Audit and Attestation; Financial Accounting and Reporting; Regulation; and Business Environment and Concepts. Applicants for CPA exam are provided their opportunity to apply for every first two months of each quarter. They can take parts of the test according to their preferences in any order but be required to pass other parts within 18 months after passing at least one part. The aspirants for becoming a certified accountant are also expected to land an entry-level internship for ramping up their resume. (Staff Writers)

Accounting is a high-demand profession that pays well and has room for advancement. According to the Bureau of Labor Statistics (BLS), jobs of accountants and auditors will rise at a rate of about 10% from 2016 to 2026, faster than the trend for all occupations. Accountants with one to three years of experience will receive between $51,500 and $96,500 a year, according to Robert Half 's 2019 Accounting and Finance Salary Guide. For five years of experience or more, you will receive up to $129,250 a year.

The location of an accountant's office is also critical in assessing his or her income capacity. The wage you would expect to receive in a given city or area is influenced by factors such as cost of living and skill shortage. Individuals of all occupations and occupations that live in places like Boston, for example, have a 34 percent higher rate of unemployment than the national average, according to Robert Half statistics. ("What Is an Accountant and What Do They Do?")

Calculation
Either using a rational function found in your research or modelling your own scenario with one, explain the function and why it is relevant in your chosen career.
- I will use average cost function formula, which is $c(x) = \frac{fixed\ cost + cx}{x}$. It shows the total cost divided by the quantity produced. Imagine that being asked to get the average cost by the management team, the accountant should answer the question. A fixed cost is one that does not change as the quantity of products or services increases or decreases, including office rental fee or labor cost. (Tuovila)
- I am working for a smartphone company. There is only one phone model in the corporation. c represents the price per the phone. x represents the number of phones sold. If the fixed cost required for producing phone model (assuming that the fixed cost is only affected by which model to be produced and is constant at the number of

production) is $90000 and the phone is priced for $800 each, the formula can be written as $c(x) = \frac{90000+800x}{x}$.

Calculate x-intercepts, y-intercepts, asymptotes, holes, maximum and minimum values (you may use technology to find the max and min values), defining intervals, domain and range. Interpret your results in the context of the field. If there are no asymptotes or holes, then use a sample function to explain a situation where each of these could occur.

Function: $c(x) = \frac{90000+800x}{x}$.
- x-intercept
  - To find the x-intercept(s), substitute in 0 for y and solve for x.
  - $0 = (90000 + 800x)/x$
  - $x = -\frac{225}{2}$
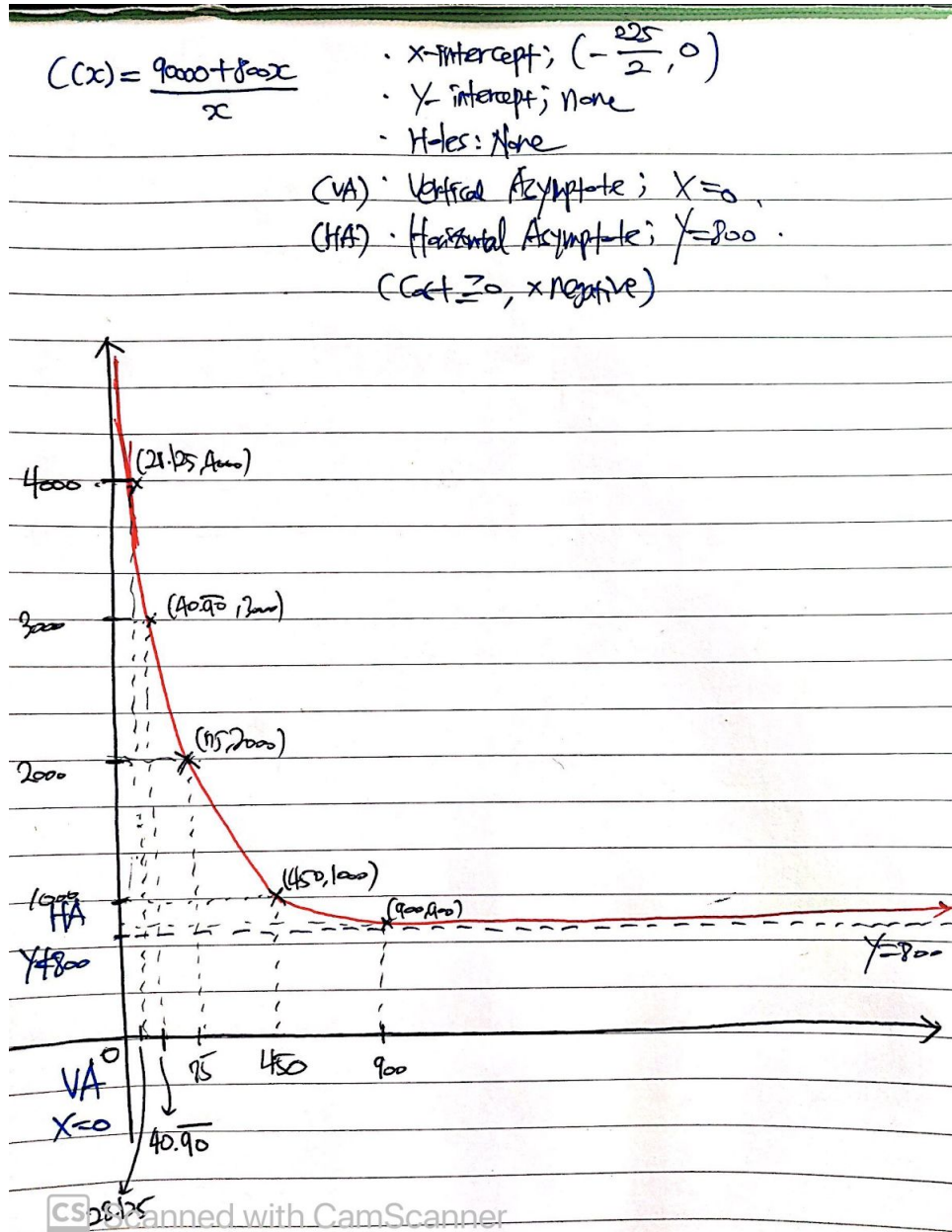 - $(-\frac{225}{2}, 0)$
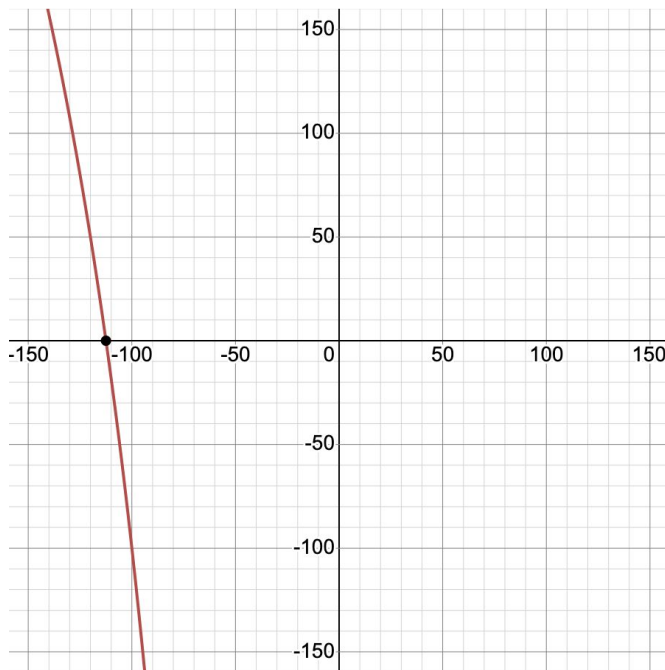
- y-intercept
  - To find the y-intercept(s), substitute in 0 for x and solve for y.
  - $y = \{90000 + 800(0)\}/0$
  - The equation has an undefined fraction. y-intercept(s): None
- Asymptotes
  - Find where the expression $c(x) = \frac{90000+800x}{x}$ is undefined.
  - Thus, vertical asymptote is $x = 0$.

  - Consider the rational function $R(x) = \frac{ax^n}{bx^m}$ where n is the degree of the numerator and m is the degree of the denominator.
    - If n < m , then the x-axis, y = 0 , is the horizontal asymptote.

- - - ■ If n = m , then the horizontal asymptote is the line $y = \frac{a}{b}$.
        - ■ If n > m , then there is no horizontal asymptote (there is an oblique asymptote).
      - ○ In the given equation, n = 1 and m = 1;
      - ○ Since n = m, the horizontal asymptote is the line $y = \frac{a}{b}$, where a = 800 and b = 1.
      - ○ The horizontal asymptote is $y = 800$;
- Holes:
  - ○ Exist when there is a common factor between numerator and denominator.
  - ○ Factor $\frac{90000 + 800x}{x}$
  - ○ $\frac{800(x + \frac{90000}{800})}{x}$
  - ○ There is no common factor.
  - ○ When fixed cost is 0, the function would be $\frac{0 + 800x}{x} = 800$, which has common factor x.
  - ○ If then, there is a hole when (0, 800).
- Max:
  - ○ If only one phone is sold, $C(1) = \frac{90000 + 800}{1} = 90800$.
  - ○ The maximum point is (1, 90800), which means that if only one phone is sold, the fixed cost is added up to the average cost directly.
  - ○ Max = 90800
- Min:
  - ○ If x approaches infinity, the average cost C goes to 800.
  - ○ As the number of phones sold is increasing in an indefinite level, the average cost will be close to $800 and the effects of fixed cost on average cost will diminish.
  - ○ Min ≈ 800
- Interval
  - ○ Factor $\frac{90000 + 800x}{x}$
  - ○ $\frac{800(x + \frac{90000}{800})}{x}$
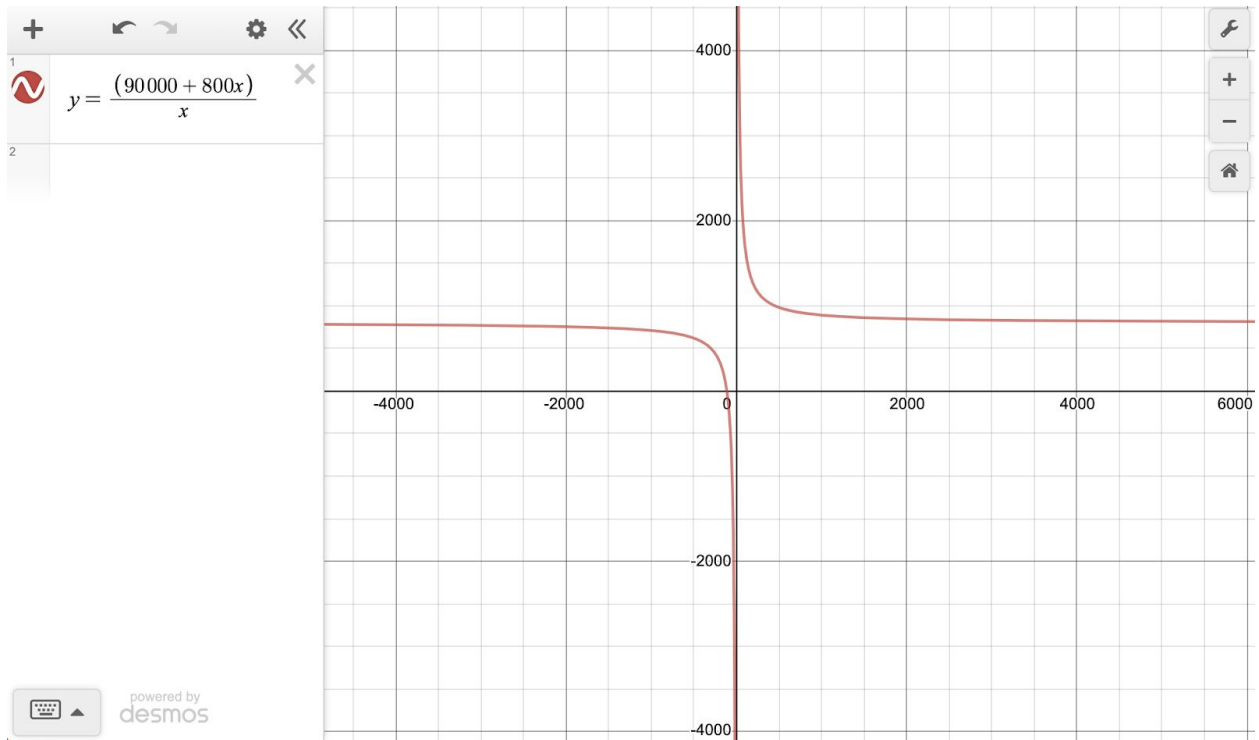 - ○ X intercept is $-\frac{90000}{800} = -\frac{225}{2}$, Vertical asymptote is $x = 0$.

	$x < -\frac{225}{2}$	$-\frac{225}{2} < x < 0$	$x > 0$
$x + \frac{90000}{800}$	-	+	+
x	-	-	+
TOTAL	+	-	+

- Domain
  - ○ To begin with, exclude the vertical asymptotes, x = 0.
  - ○ Since x represents the number of phones sold, it should be greater than 0.
  - ○ Therefore, the answer is $\{x \mid x > 0, x \in R\}$
- Range

- To note, C represents the average cost, it must be greater than 0.
- The horizontal asymptote values which is C = 800.
- Since the least x value is 1, the maximum C value would be 90800
- Therefore, $\{y\mid 800 < y \le 90800,\ y \in R\}$

- Graph by hand

$$C(x) = \frac{90000 + 800x}{x}$$

- x-intercept; $\left(-\frac{225}{2}, 0\right)$
- Y-intercept; none
- H-les: None
- (VA) Vertical Asymptote; $x = 0$,
- (HA) Horizontal Asymptote; $Y = 800$.
  - $(C(x) \ge 0,\ x\text{ negative})$

- Graph by technology

$$y = \frac{(90000 + 800x)}{x}$$

Conclusion

We can conclude that in the accounting and economics field there are lots of rational functions being used. This report shows one example of calculating the average cost of products, but there are more rational functions being utilized by accountants to solve the business issues.

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