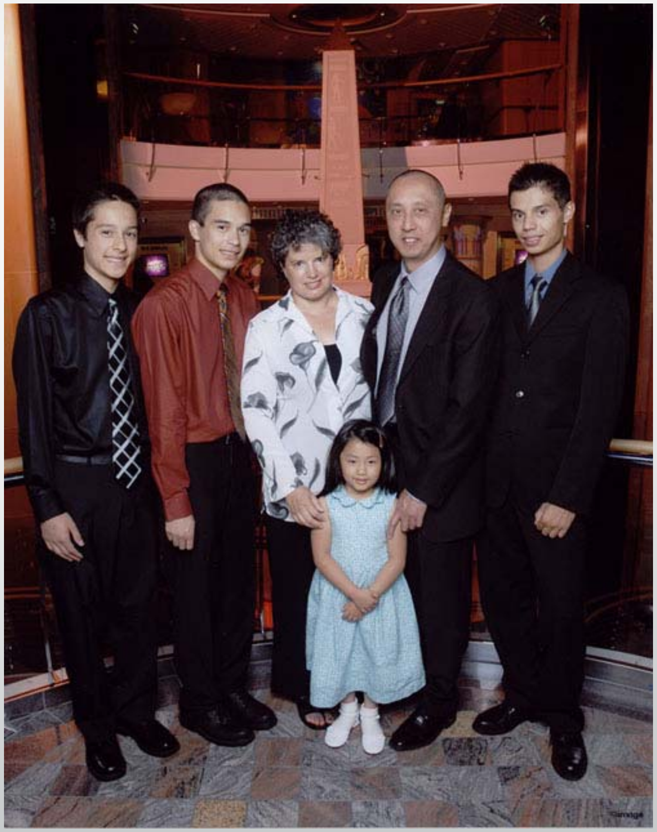
Welcome to Mr. Amory Wong's Calc 12 Class!

WORK and education

- Electronic Arts – 20 years
- PlayLand, 7-Eleven, Moki's Pizza, and more
- SFU Bachelors of Math and Computing Science
- SFU Bachelors of Education
- Douglas College, UBC, Langara College, VVI

Personal

- Family guy
- Farming
- Sports
- Math and Computer
- Creating and Fixing



Philosophy

- Professional
- Caring
- Collaborative
- Patient
- Innovative

Students' Advice

keep on track and study

year's class?
Don't try to do all the works at the end.

Never be lazy.

-Ask questions in class.

dvice would you give to next year's class?
dont stress too much, dont fall behind schedule and just try your best

hat advice would you give to next year's class?
DO YOUR HOMEWORK!
ASK for help!!!
Review/Study/practice
Don't Give UP

hat advice would you give to next year's class?
Stick with the schedule or ahead of it

-show Mr. Wong your homework (easy marks)

watch mr wongs videos and have a study partner for tests

don't fall behind, go in for extra help do the Review packages!

don't fall behind and do the videos and bonus things because it really helps your mark.

Fairness

our marks fair (why or why not)?

Yes, really appreciate the bonus marks

I would say so

Yes. He gives life lines and extensions

yes

yes

Yes

yes, It's fair.

yes he was I think that he was very reasonable.

yes, he was always on our side

Yes, he helped you improve if you wanted to.

yes, you are too kind

Yes. We had lot's of chances to improve our marks.

very fair, most concepts have been taught well, and the cemc videos also helped

Yes because he gave us alot of chances to improve our marks and to learn better no

No!

No

no

Was Mr. Wong Scary?

Yes ~~because Mr. Wong~~ bc I didn't know Mr. Wong
No because I know his teaching better.

kinda at the begining, I'm not sure why. By the end of the year that wore off.

yes at the start, I felt that he may judge me if I got an answer wrong. I am not anymore

Would you want Mr. Wong as a teacher again (also give a letter grade if you like)?

no, because I had been taught by him in the past

Classroom Procedures for Teacher and Students

to create a positive learning environment for all!

Teacher Responsibilities

- Prepared
- Help
- Available
- Respect students
- Fun

Student Responsibilities

- Prepared
- Participate
- Responsible
- Respect
- No cell phones or computers for non-course related use
- Note needed for absence
- Medical note need for missed exams

Lesson Format

- Lectures
  - May provide video lessons
  - Always ask questions if presentation is unclear
  - Note templates are provided
- Work Time
  - Do some work in-class
  - Check your answers
  - You need to learn to be more responsible
- Socratic.org

Course Outline

- Chapter 2 – Limits and Continuity
- Chapter 3 - Derivatives
- Chapter 4 – Applications of Derivatives
- Chapter 5 – The Definite Integral
- Chapter 6 – Differential Equations and Mathematical Modelling
- Chapter 7 – Applications of Definite Integrals
- Chapter 8 –L'Hopital's Rule, Improper Integrals, and Partial Fractions
- Semantics
- Learn to make notes

Homework (Work)

- About double the amount of work compared to PreCalc 12
- Really important to complete after each lesson
- Assigned work is “C+” to “B”
- Challenge work is “B” to “A”
- 15% is for regular work (not challenge questions)
- 5% is for work to show in person

Assessment

- Assessment will be based on chapter tests (60%) and homework (20%).
- The final exam will be worth 20%.
- Marks will be computed on a percentage basis.
- Students may earn bonus marks through extra work.
- 2 handwritten reference sheets (4 sides) permitted on tests
- No cell phones for tests
- Online Marks

Calculators

- Recommend TI-83, TI-84, Casio fx-9750, or Casio fx-9860
- Learn to use them properly, ask if you're not sure
- Borrowing (post-dated cheque), you are responsible for the batteries
    - TI-83 - $100 deposit
    - Casio fx-9750 - $70 deposit

Samples

EXAMPLE 12 **Repeated Application of the Chain Rule**

$$f(t) = \sin^3 4t \qquad \text{Original function}$$
$$= (\sin 4t)^3 \qquad \text{Rewrite.}$$
$$f'(t) = 3(\sin 4t)^2 \frac{d}{dt}[\sin 4t] \qquad \text{Apply Chain Rule once.}$$
$$= 3(\sin 4t)^2(\cos 4t)\frac{d}{dt}[4t] \qquad \text{Apply Chain Rule a second time.}$$
$$= 3(\sin 4t)^2(\cos 4t)(4)$$
$$= 12 \sin^2 4t \cos 4t \qquad \text{Simplify.}$$

EXAMPLE 4 **Change of Variables**

Find $\int \sqrt{2x-1}\, dx$.

Solution First, let u be the inner function, $u = 2x - 1$. Then calculate the differential du to be $du = 2\, dx$. Now, using $\sqrt{2x-1} = \sqrt{u}$ and $dx = du/2$, substitute to obtain

$$\int \sqrt{2x-1}\, dx = \int \sqrt{u}\left(\frac{du}{2}\right) \qquad \text{Integral in terms of } u$$
$$= \frac{1}{2}\int u^{1/2}\, du \qquad \text{Constant Multiple Rule}$$
$$= \frac{1}{2}\left(\frac{u^{3/2}}{3/2}\right) + C \qquad \text{Antiderivative in terms of } u$$
$$= \frac{1}{3}u^{3/2} + C \qquad \text{Simplify.}$$
$$= \frac{1}{3}(2x-1)^{3/2} + C. \qquad \text{Antiderivative in terms of } x$$

EXAMPLE 2 **Sketching the Graph of a Rational Function**

Analyze and sketch the graph of $f(x) = \dfrac{x^2 - 2x + 4}{x - 2}$.

Solution

First derivative:	$f'(x) = \dfrac{x(x-4)}{(x-2)^2}$
Second derivative:	$f''(x) = \dfrac{8}{(x-2)^3}$
x-intercepts:	None
y-intercept:	$(0, -2)$
Vertical asymptote:	$x = 2$
Horizontal asymptotes:	None
End behavior:	$\lim_{x\to-\infty} f(x) = -\infty$, $\lim_{x\to\infty} f(x) = \infty$
Critical numbers:	$x = 0$, $x = 4$
Possible points of inflection:	None
Domain:	All real numbers except $x = 2$
Test intervals:	$(-\infty, 0), (0, 2), (2, 4), (4, \infty)$

Samples

EXAMPLE 1 Using the Shell Method to Find Volume

Find the volume of the solid of revolution formed by revolving the region bounded by

$$y = x - x^3$$

and the x-axis $(0 \le x \le 1)$ about the y-axis.

Solution Because the axis of revolution is vertical, use a vertical representative rectangle, as shown in Figure 7.30. The width Δx indicates that x is the variable of integration. The distance from the center of the rectangle to the axis of revolution is $p(x) = x$, and the height of the rectangle is

$$h(x) = x - x^3.$$

Because x ranges from 0 to 1, the volume of the solid is

$$\begin{aligned} V = 2\pi \int_a^b p(x)h(x)\,dx &= 2\pi \int_0^1 x(x - x^3)\,dx && \text{Apply shell method.} \\ &= 2\pi \int_0^1 (-x^4 + x^2)\,dx && \text{Simplify.} \\ &= 2\pi \left[-\frac{x^5}{5} + \frac{x^3}{3} \right]_0^1 && \text{Integrate.} \\ &= 2\pi \left(-\frac{1}{5} + \frac{1}{3} \right) \\ &= \frac{4\pi}{15}. \end{aligned}$$

EXAMPLE 2 Compressing a Spring

A force of 750 pounds compresses a spring 3 inches from its natural length of 15 inches. Find the work done in compressing the spring an additional 3 inches.

Solution By Hooke's Law, the force $F(x)$ required to compress the spring x units (from its natural length) is $F(x) = kx$. Using the given data, it follows that $F(3) = 750 = (k)(3)$ and so $k = 250$ and $F(x) = 250x$, as shown in Figure 7.50. To find the increment of work, assume that the force required to compress the spring over a small increment Δx is nearly constant. So, the increment of work is

$$\Delta W = (\text{force})(\text{distance increment}) = (250x)\,\Delta x.$$

Because the spring is compressed from $x = 3$ to $x = 6$ inches less than its natural length, the work required is

$$\begin{aligned} W &= \int_a^b F(x)\,dx = \int_3^6 250x\,dx && \text{Formula for work} \\ &= 125x^2 \Big]_3^6 = 4500 - 1125 = 3375 \text{ inch-pounds.} \end{aligned}$$

Samples

EXAMPLE 1 Integration by Parts

Find $\int xe^x\,dx$.

Solution To apply integration by parts, you need to write the integral in the form $\int u\,dv$. There are several ways to do this.

$$\int \underbrace{(x)}_{u}\underbrace{(e^x dx)}_{dv}, \quad \int \underbrace{(e^x)}_{u}\underbrace{(x\,dx)}_{dv}, \quad \int \underbrace{(1)}_{u}\underbrace{(xe^x\,dx)}_{dv}, \quad \int \underbrace{(xe^x)}_{u}\underbrace{(dx)}_{dv}$$

The guidelines on page 525 suggest choosing the first option because the derivative of $u = x$ is simpler than x, and $dv = e^x\,dx$ is the most complicated portion of the integrand that fits a basic integration formula.

$$dv = e^x\,dx \quad \Rightarrow \quad v = \int dv = \int e^x\,dx = e^x$$

$$u = x \quad \Rightarrow \quad du = dx$$

Now, integration by parts produces

$$\int u\,dv = uv - \int v\,du \qquad \text{Integration by parts formula}$$

$$\int xe^x\,dx = xe^x - \int e^x\,dx \qquad \text{Substitute.}$$

$$= xe^x - e^x + C. \qquad \text{Integrate.}$$

To check this, differentiate $xe^x - e^x + C$ to see that you obtain the original integrand.

EXAMPLE 1 Distinct Linear Factors

Write the partial fraction decomposition for $\dfrac{1}{x^2 - 5x + 6}$.

Solution Because $x^2 - 5x + 6 = (x - 3)(x - 2)$, you should include one partial fraction for each factor and write

$$\frac{1}{x^2 - 5x + 6} = \frac{A}{x - 3} + \frac{B}{x - 2}$$

where A and B are to be determined. Multiplying this equation by the least common denominator $(x - 3)(x - 2)$ yields the **basic equation**

$$1 = A(x - 2) + B(x - 3). \qquad \text{Basic equation}$$

Because this equation is to be true for all x, you can substitute any *convenient* values for x to obtain equations in A and B. The most convenient values are the ones that make particular factors equal to 0.

To solve for A, let $x = 3$ and obtain

$$1 = A(3 - 2) + B(3 - 3) \qquad \text{Let } x = 3 \text{ in basic equation.}$$

$$1 = A(1) + B(0)$$

$$A = 1.$$

To solve for B, let $x = 2$ and obtain

$$1 = A(2 - 2) + B(2 - 3) \qquad \text{Let } x = 2 \text{ in basic equation.}$$

$$1 = A(0) + B(-1)$$

$$B = -1.$$

So, the decomposition is

$$\frac{1}{x^2 - 5x + 6} = \frac{1}{x - 3} - \frac{1}{x - 2}$$

Don’t be Just Another Student

- CG Scholarships and Bursaries
- Reputation
- Not just academics
- Talk to teachers
- Join clubs or teams
- Enter contests (math, physics, others)
- Not only for school

Cheating

- Copying other people's work
- Letting other people copy your work
- Having other people do your work
- Doing other people's work
- A mark of zero may be assigned
- Parents may be notified
- Could end up on your school record
- Could impact your ability to get scholarships and bursaries

Questions?

Course Outline

- Chapter 1 – Limits and Their Property
- Chapter 2 - Differentiation
- Chapter 3 – Applications of Differentiation
- Chapter 4 – Integration
- Chapter 5 – Logarithmic, Exponential, and Other Trascendental
- Chapter 6 – Differential Equations
- Chapter 7 – Applications of Integration
- Chapter 8 – Integration Techniques, L'Hopital's Rule, Improper Integrals
- Semantics
- Learn to make notes