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# CSE 173: DISCRETE MATHEMATICS

Md. Shahriar Karim (MSK1)

*Assistant Professor  
Department of ECE  
North South University  
Bangladesh*

Office: SAC 1045 B

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**Why Discrete Mathematics ?**

# Discrete Mathematics

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- Computer Science is no more about computers than astronomy is about telescopes.  
– *Edsger Dijkstra, 1970. (though disputed)*
- CSE, as a discipline, uses mathematics extensively to model and solve problems that we often experience in our real world

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➤ Suppose

- You are working on some research problem, and in the process, you derive

$$2 = 1$$

# The Proof May Surprise All; Perhaps

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$$a = b$$

$$a^2 = ab$$

$$a^2 - b^2 = ab - b^2$$

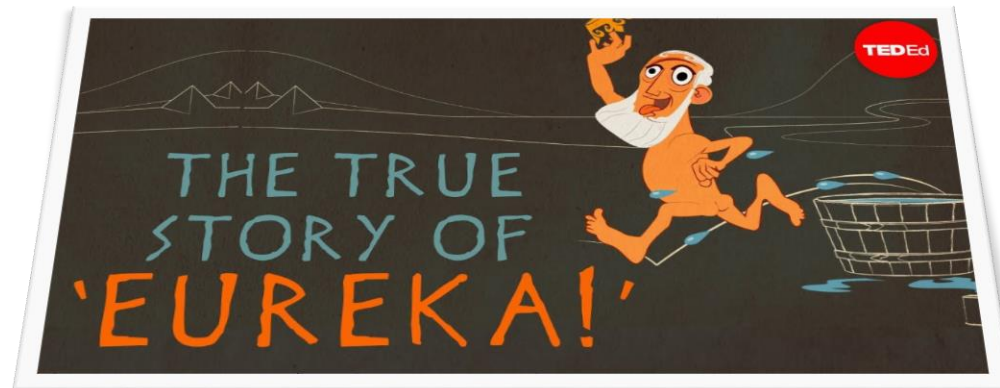
$$(a + b)(a - b) = b(a - b)$$

$$a + b = b$$

$$2b = b$$

$$2 = 1$$

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➤ And you apply for the

**Fields Medal**

# Fields Medal?

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➤ The committee replied back saying—

You lack in mathematical maturity,  
so, you should enrol in

**CSE 173: Discrete Mathematics**

# CSE 173: DISCRETE MATHEMATICS

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- Logic System
  - Expressing Ideas/Texts into Logic Form
  - Inference for argument building
  - Proof Techniques
- Mathematical Topics
  - Covers basics of sets, functions, and proofs etc.
- Recursion
- Counting and Combinatorics
- Graph



# Frequently Asked Questions

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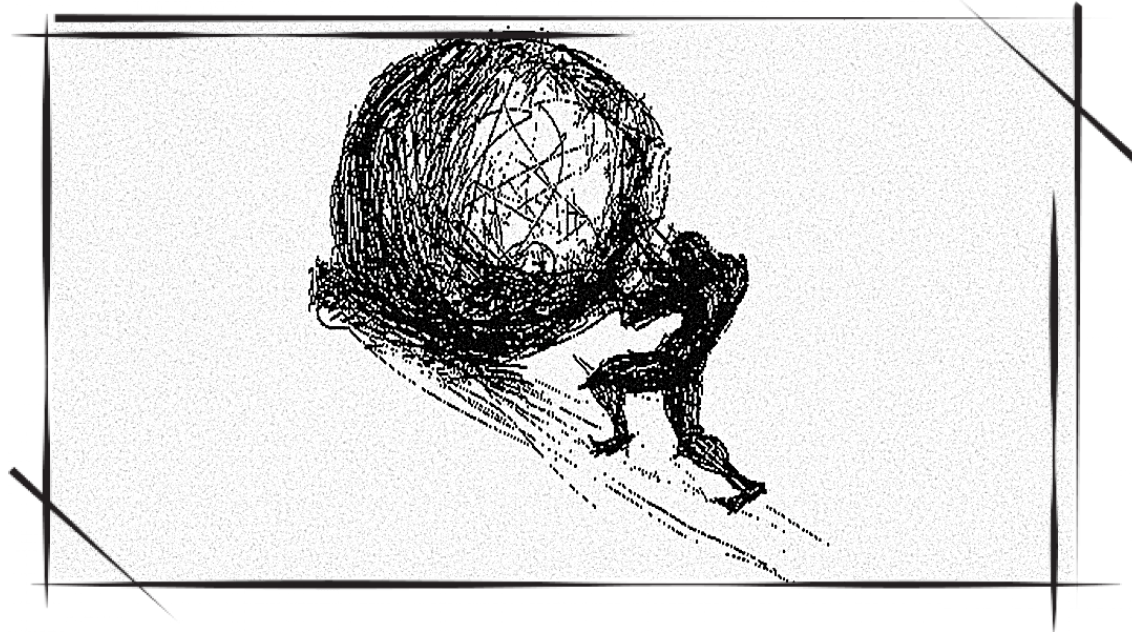
**How can I do well in this course?**

# No magic formula to do well

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It doesn't fall from sky like the Newtonian Apple

||| Instead



It is hard-earned

# Frequently Asked Question

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Any suggestions/tips/তরিকা/কৌশল  
to do well in this course?

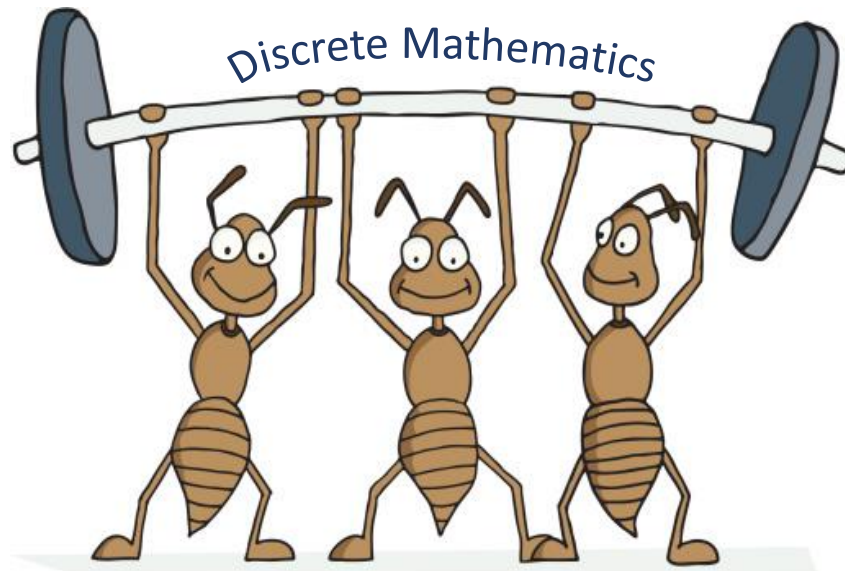
# You Should Know Your Peers

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## Academic engagement becomes easier—

- Problem solving and discussion
- Class notes collection and clarification
- Exam preparation, and more importantly
- Sympathy, Empathy; reduces Apathy!



# You Must Act **Professionally**

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## Be Responsible:

If you are sure about your mistakes, don't blame others; to err is human.

## Be Respectful:

If you are answering, arguing or debating on some topic in class, use reasonable language and feel free to carry on.

## Be Reliable:

If you are saying something to someone in the class- be that your classmates or your teacher- please be true with it.

# Be a bit “Unsocial”; Digitally

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**Minimize the amount of time you  
spend in social media**

# Facebook<sup>®</sup> and academic performance

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Paul A. Kirschner<sup>a,\*</sup>, Aryn C. Karpinski<sup>b</sup>

## 4.1. Participants

Data were collected from 102 undergraduate and 117 graduate students at a large, public Midwestern university ( $N = 219$ ). The sample consisted of 87 (39.7%) male participants, and 132 female participants (60.3%). The majority of participants identified themselves as Caucasian (73.1%), with the next largest group identified as Asian (11.9%). Other ethnicities represented include African-American (7.8%), Bi-racial (3.2%), Hispanic (2.3%), Multi-racial (.9%), and Other (.9%). Participants were predominantly traditional college students with undergraduate (46.6%) and graduate (53.4%) students having a mean age of approximately 22.06 ( $SD = 3.72$ ) and 30.29 ( $SD = 7.03$ ), respectively.

# Facebook<sup>®</sup> and academic performance

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Paul A. Kirschner<sup>a,\*</sup>, Aryn C. Karpinski<sup>b</sup>

## Results show that

- Facebook users reported having lower GPAs, and
- They spend fewer hours per week studying than nonusers.

So,

Everything has a cost



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# Strategies to Deal with NSU Exam Pressure

# NSU exam pressure

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- Spend 5-10 minutes after each class you attend.
  - Recollect the technical terms covered in the class
  - Discuss a few basic concepts while you walk down to other classes.
- Prepare **flash-cards** for different topics of a course
  - Use different colours for different courses
  - Carry a few flash-cards of each courses always with you; replace the cards with new ones you prepare on the other topics.

# NSU exam pressure

- Prepare notes using minimum number of pages
  - Contain the final and midterm exam syllabus within 6-8 pages (single-side) concise notes



You may follow the crib sheet concept

<span style="font-size: 2em; font-weight: bold; border: 1px solid black; padding: 2px;">MATHS</span> <span style="font-size: 1.5em; font-weight: bold; padding: 2px;">MULTIVARIABLE CALCULUS</span>	
<b>PARAMETRIC EQUATIONS</b> $x=f(t), y=g(t) \quad dx=f'(t)dt, dy=g'(t)dt$ <small>IF THE CURVE IS DESCRIBED BY <math>x=f(t), y=g(t)</math> ON <math>\alpha \leq t \leq \beta</math>, <math>f'(t)</math> AND <math>g'(t)</math> ARE CONTINUOUS ON <math>[\alpha, \beta]</math> AND THE CURVE IS TRAVERSED ONCE AS <math>t</math> GOES FROM <math>\alpha \rightarrow \beta</math>, THEN...</small>	<b>TANGENTS</b> 1st & 2nd Deriv, $dx/dt \neq 0$ $\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} \quad \frac{d^2y}{dx^2} = \frac{d}{dx} \left( \frac{dy}{dx} \right) = \frac{d}{dt} \left( \frac{dy}{dx} \right) \cdot \frac{dt}{dx} = \frac{d}{dt} \left( \frac{dy}{dx} \right) \cdot \frac{1}{\frac{dx}{dt}}$
<b>AREA</b> $A = \int_a^b y dx = \int_a^b g(t)f'(t)dt$ or $\int_a^b g(t)f'(t)dt$	<b>SURFACE AREA</b> <span style="border: 1px solid black; padding: 2px;">□□□□□□□□</span> $S = \int_a^b 2\pi y \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$ <small>ROTATED ABOUT THE X-AXIS</small>
<b>ARC LENGTH</b> $L = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx = \int_a^b \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$	<small>ROTATED ABOUT THE Y-AXIS</small> $S = \int_a^b 2\pi x ds$ (ROT. AB Y-AXIS) $S = \int_a^b 2\pi x ds$ (ROT. AB X-AXIS) $ds = \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$
<b>POLAR COORDINATES</b> <small>GRAPHING: <math>(\cos(2\theta), \sin(2\theta))</math></small>	<b>PARAMETERIZED</b> $r=r(\theta)$ <span style="margin-left: 20px;"><math>\frac{dy}{dx} = \frac{dr \sin \theta + r \cos \theta}{dr \cos \theta - r \sin \theta}</math></span> <span style="margin-left: 20px;">HORIZ. <math>\frac{dy}{dx} = 0</math> (<math>\frac{dx}{dt} \neq 0</math>)</span>

# Suggestions For CSE 173

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- Ask questions in class to clear your doubts— don't shy away from asking questions.
- Concepts taught in this class require some time; so, keep calm and carry on.
- Sit and discuss with your peers [**at least once per week**] outside the class.

# Suggestions For CSE 173

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- Read the text book sections before the corresponding lectures
- Use the office hours (Instructor and TA) efficiently
- Practice the given examples in your text book— don't skim through the solutions given there.
  - Doesn't help— develops **false confidence** that You Can Do

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**To be continued ...**