# ENGR 10 Course Wrap-up

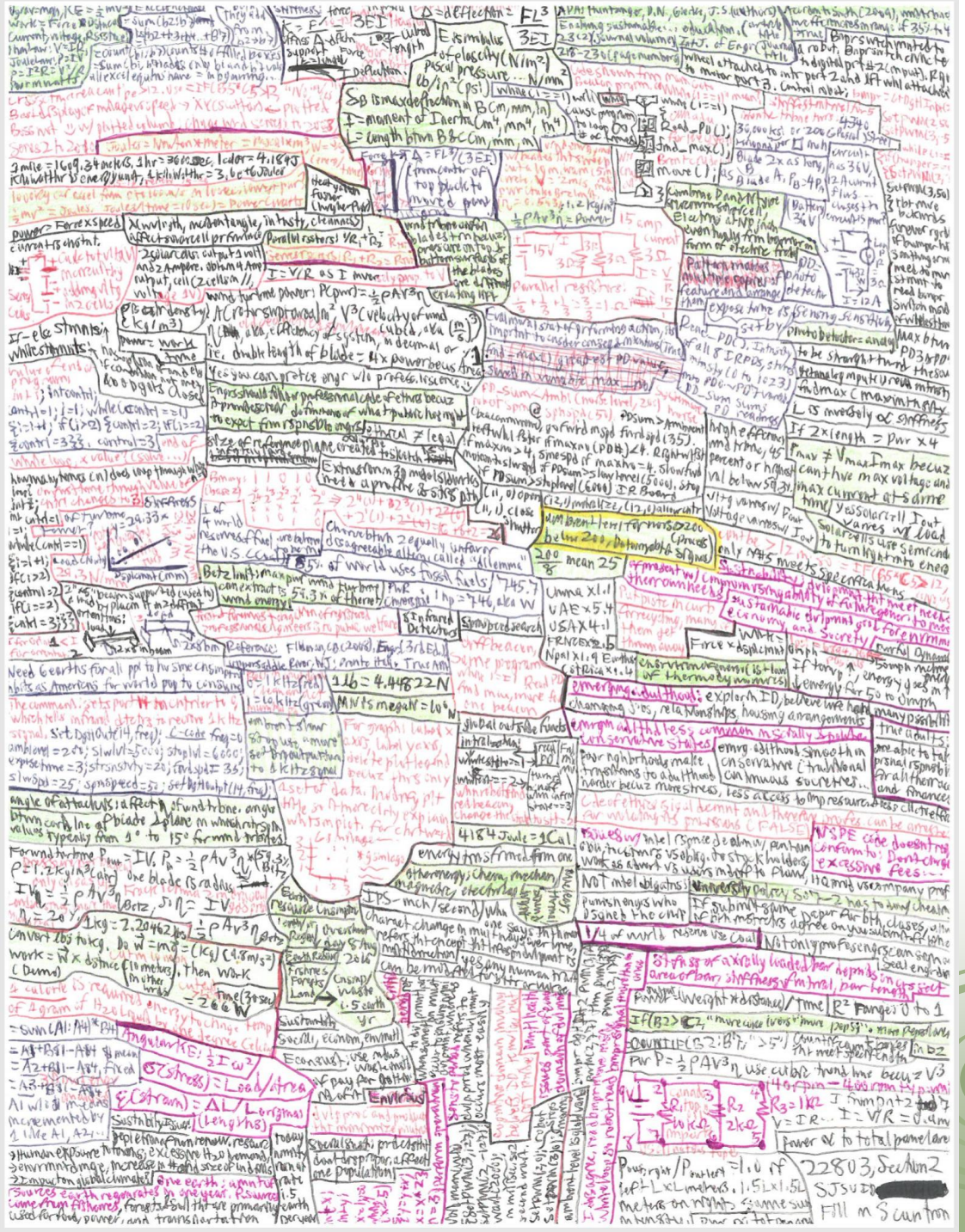
## Fall 2019

# About the E 10 Final Exam For Fall 2019

- **When?**
  - Section 01: Wed. Dec. 11, 7:15 am – 9:00 am **in MD 101**
  - Section 02: Friday Dec. 13 from 12:15 – 2:00 pm **in MD 101**

# Bring the Following to the Final Exam

- One review sheet, 8.5 x 11
  (one side only, 12 font or larger)
- WRITE YOUR NAME on the review sheet – it will be collected
- #2 pencil & good eraser
- Calculator
  - NOTE: Any class information stored in the calculator will be considered cheating per SJSU rules.
- Answer sheet, T&E-0200 (blue color) from the bookstore, over 50 questions



SEE IMPORTANT MARKING INSTRUCTIONS ON SIDE 2

NAME (Last, First, M.I.)

TEST

| FORM | NUMB |
|---|---|
| | |
| 0 | 0 0 0 |
| 1 | 1 1 1 |
| 2 | 2 2 2 |
| 3 | 3 3 3 |
| 4 | 4 4 4 |
| 5 | 5 5 5 |
| 6 | 6 6 6 |
| 7 | 7 7 7 |
| 8 | 8 8 8 |
| 9 | 9 9 9 |

CLASS LEVEL

- Freshman
- Soph.
- Junior
- Senior
- Graduate

SEX

- Male
- Female

SCANTRON · Mark Reflex® EM-87172-2:65 ED05

STUDENT ID NUMBER

COURSE I.D.

SPECIAL CODES

# GENERAL PURPOSE ANSWER SHEET

SIDE 1

COURSE _____ INSTRUCTOR _____

## USE NO. 2 PENCIL ONLY

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 |
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| 4 | 1 | 2 | 3 | 4 | 5 |
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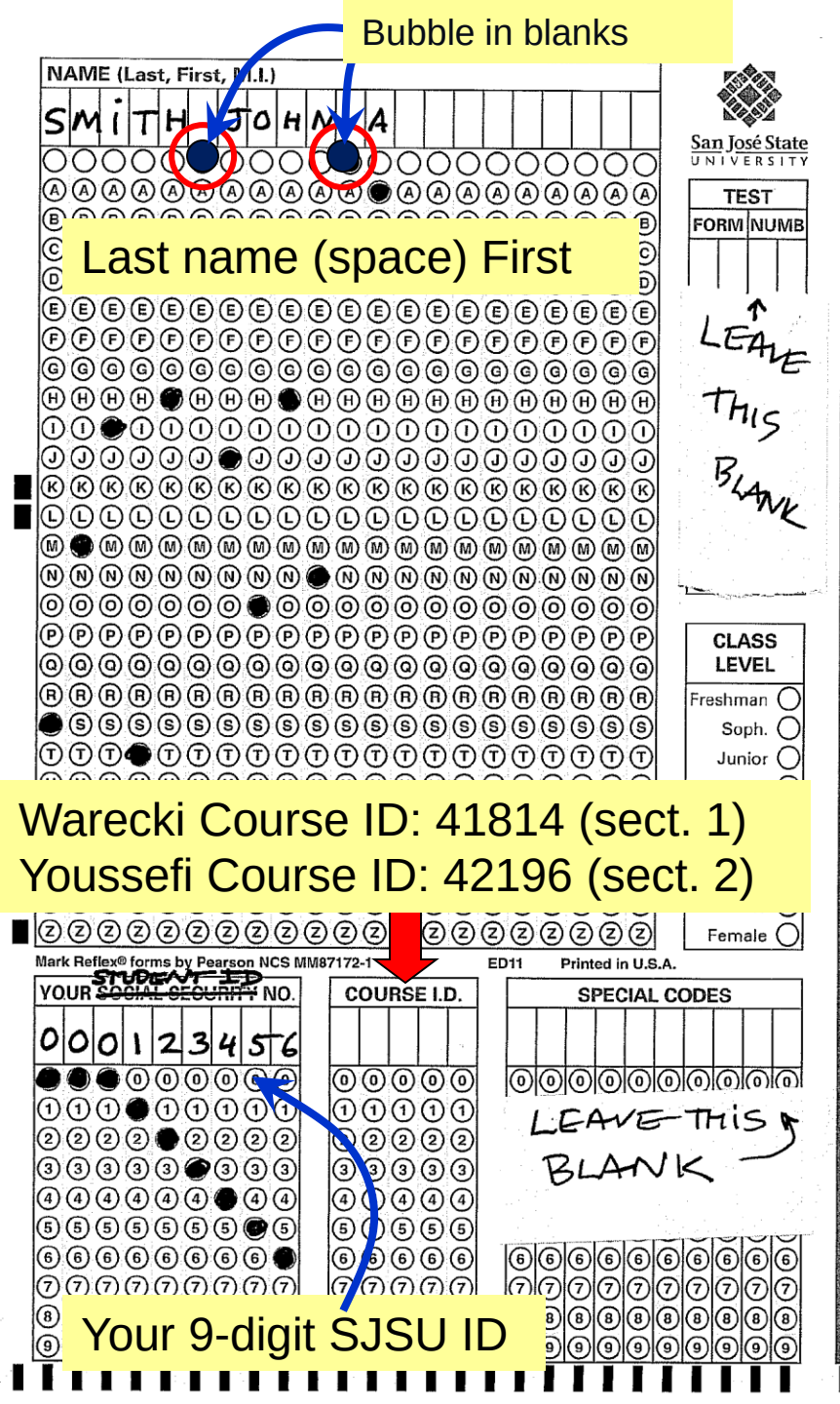
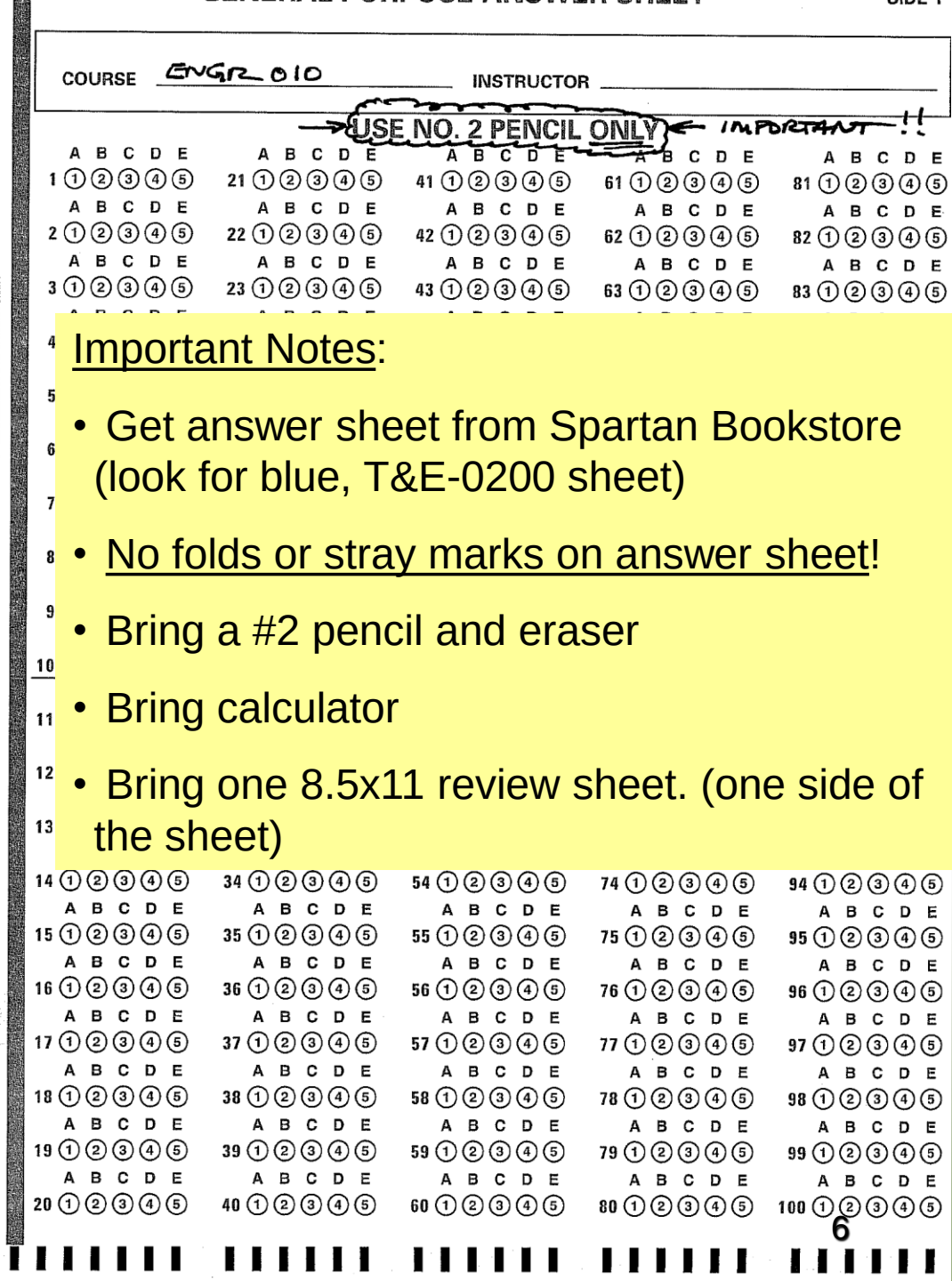
| 99 | 1 | 2 | 3 | 4 | 5 |
| 100 | 1 | 2 | 3 | 4 | 5 |




## Important Notes:

- Get answer sheet from Spartan Bookstore (look for blue, T&E-0200 sheet)
- No folds or stray marks on answer sheet!
- Bring a #2 pencil and eraser
- Bring calculator
- Bring one 8.5x11 review sheet. (one side of the sheet)

# Areas of study (should include but not limited to):

- **Units**
- **Excel**
  - Basic operations (*, -, /, +)
  - Functions logical (if, countif, etc.) statistical (mean, variance)
  - Cells: programming and copying
  - Plotting: what makes a complete correct graph
  - Selecting the correct type of graph
- **Technical writing**
  - The basic sections of a report
  - Proper formatting for figures and tables
  - Issues of audience and purpose
  - APA formatting for references
- **SolidWorks**
  - Basic commands: Extrusion, Revolve, Sweep and Loft.

# Areas of study (should include but not limited to):

- **Ethics**
- **Solar Cells**
  - Basic concepts, how they work, basic composition of atoms
  - Conductors, insulators, semiconductors
  - N, P type
  - PN junction, electrons, holes
  - Cells in a circuit: series, parallel
  - Ohm's Law to calculate V, R and I
- Structural Behavior
  - Definition of stiffness
  - Moment of Inertia
  - Relative stiffness of different  structural elements
  - Relative stiffness of different  materials

# Areas of study (should include but not limited to):

- **C Programming**
  - IF Statements
  - IF-ELSE Statements
  - WHILE Statements
  - Basics of robot programming
    - Getting the wheels to turn forwards and backwards
    - Making the bumper switches and limit switches work
- **Energy and Power**
  - Calculations of power and energy for mechanical systems
    - PE = mgh  KE = $mv^2/2$
    - Work = Force X Distance
  - Calculations of power and energy for electrical systems
  - Efficiency

# Areas of study (should include but not limited to):

- **Sustainability**
  - Sustainability concepts
  - Recycling and resource use
  - Greenhouse gases and effects
- **Engineering as a profession**
  - Licensure requirements, training, testing
  - Engineering majors, specialization
  - Lifelong learning
- **Engineering design**
  - Function, form, materials
  - Process - Basic elements of engineering design process
  - Human factors

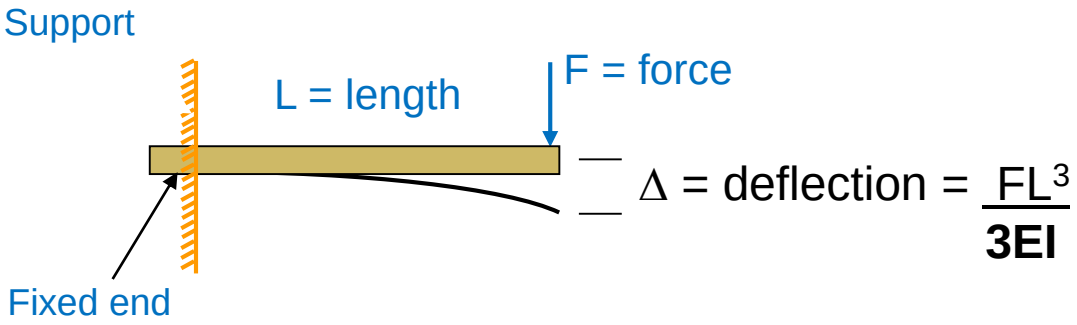
# What is the final value of A?

```
Int A;
Int i;
A = 0;
i = 0;
while (i < 3)
{
  A = A + i;
  i = i + 1;
}
```

Ans. (A) 2, (B) 3, (C)4, (D) 6, (E)10

# What is the Stiffness of this Beam?

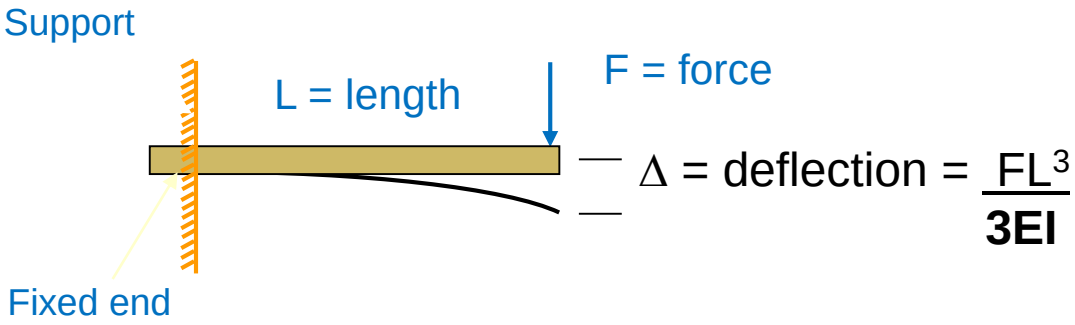
## Deflection of a Cantilever Beam




$$K = \frac{F}{\Delta} = \frac{3EI}{L^3}$$

# If you increase the length of this beam what will happen to its stiffness?

## Deflection of a Cantilever Beam

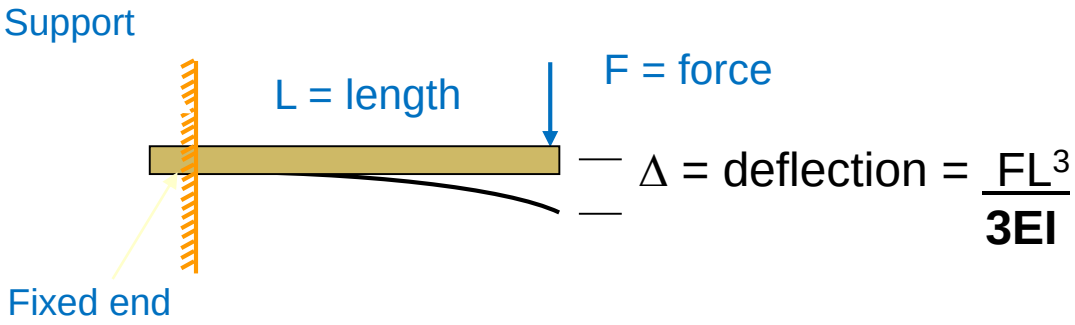



**a) Increase**

**b) Decrease**

# Double the length of this beam. What will happen to its stiffness?

## Deflection of a Cantilever Beam




**a) 1/8 x stiffness**

**b) 1/2 x stiffness**

**c) 2 x stiffness**

**d) 8 x stiffness**

# Consider a wind turbine design. If you double the length of the blades, what happens to the power it produces?

P (power) = $\frac{1}{2} \rho A V^3 \eta$

**a) 1/2 x power**

**b) 2 x power**

**c) 4 x power**

**d) 8 x power**

**e) 16 x power**

Consider a wind turbine design.
If the efficiency is increased by a factor of 2, what happens to the power it produces?

$$P \text{ (power)} = \tfrac{1}{2} \rho A V^3 \eta$$

**a) 1/2 x power**

**b) same power**

**c) 2 x power**

**d) 4 x power**

**e) 8 x power**

# Power Calculation

**The following expression can be used to calculate power: Power = Force × Speed**

- True/False

Answer:

Power = work/time

= force x distance/time

= force x speed

**True**

**Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved**

True/False

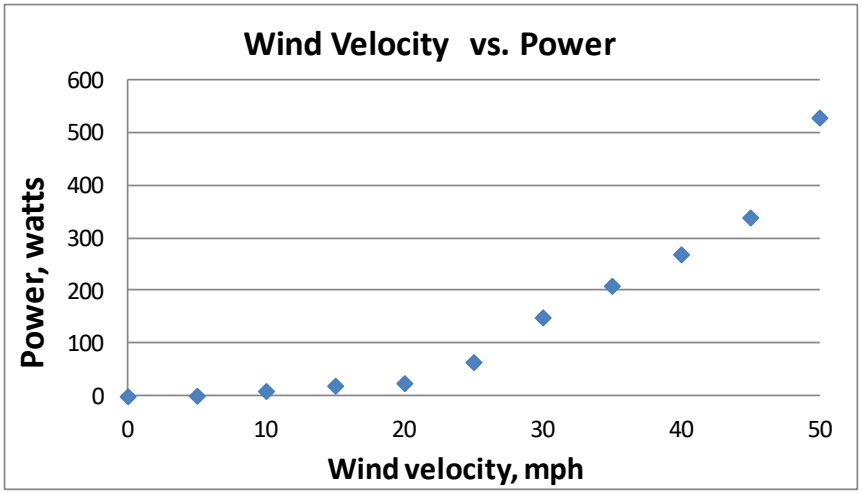
| | A | B | C |
|---|---|---|---|
| 1 | **Name** | **Car model** | **Year Purchased** |
| 2 | Hernandez | Ferrari Spider | 2001 |
| 3 | Nguyen | Prius | 2009 |
| 4 | Smith | Nissan Leaf | 2011 |
| 5 | Boudreau | Tesla Model S | 2011 |
| 6 | Lee | Taurus | 1996 |
| 7 | Franz | Jeep Wrangler | 2005 |
| 8 | | | |

- You type the following command in cell A8 =COUNTIF(C2:C7,>2005), What will appear in cell A8?

**A) 2  B) 3  C) 4  D) error**

# I have collected some data from a wind turbine test.

## What kind of trend line should I select?

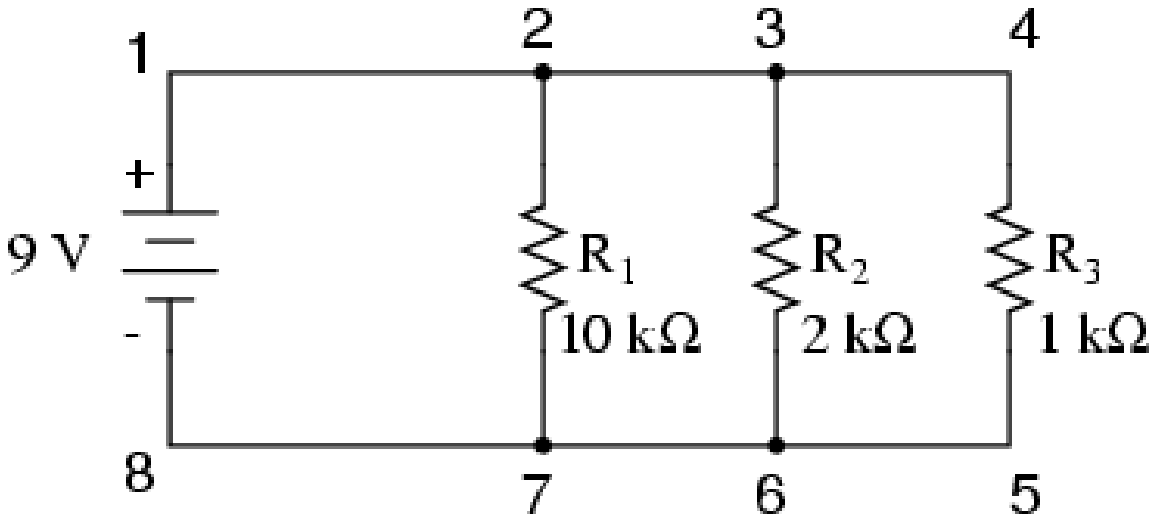



A. Linear
B. Quadratic
C. Cubic
D. Exponential
E. Any function that minimizes $R^2$

**Why?**

P (power) = ½ $\rho A V^3 \eta$

# What is the current flowing between point 2 and 7?




$V = IR$

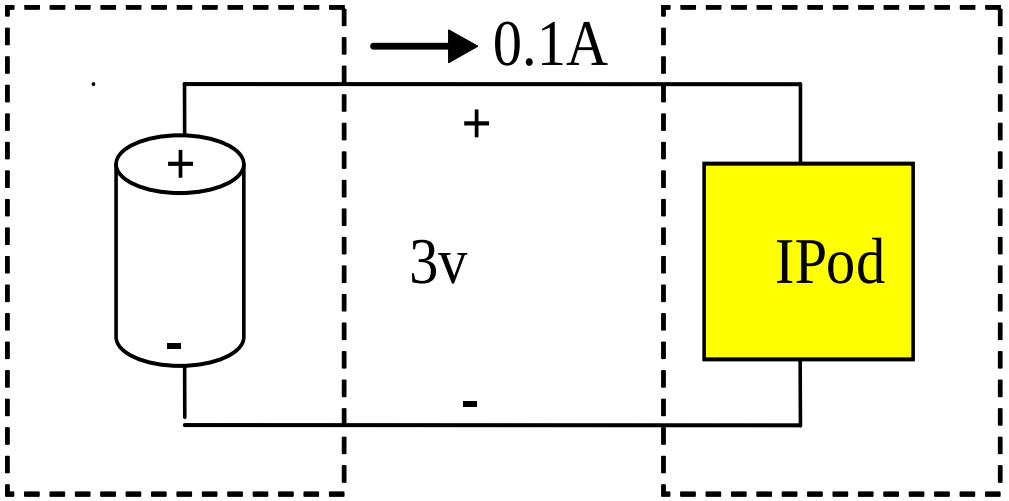
$9\ V = I_1(10\ k\Omega)$

$I_1 = 9/10{,}000 = 0.9\ mA$

# What is the typical efficiency of a wind turbine?

A. 90%-100%
B. 75% - 80%
C. 35% - 45%
D. 20% - 30%
E. 10% - 15%

From the values given in the diagram below, what is the resistance (R) of an IPod?




(a) 0.3 Ω
(b) 3.1 Ω
(c) 0.03 Ω
(d) 30 KΩ
(e) 30 Ω

If you use the Sweep command in SolidWorks to create a feature, which statement is true?

A. A solid with round edges is created
B. A solid with variable cross section is created
C. A solid with a uniform cross section is created
D. A solid with hollow section is created
E. None of the above

What value of x will cause the motor to be stopped for a Cortex controller: SetMotor(2, x)?

A. 127
B. 125
C. 0
D. 255
E. 265

What is the meaning of the value 2 in this statement: SetMotor(2, x)?

The motor is plugged into slot (Port) #2 on the controller.

# Goodbye

- *Adios*
- *Auf Wiedersehn*
- *Sayonara*
- *Alavida* अलविदा
- *Au Revoir*
- *Shalom*
- *Arrivederci, Ciao*
- *Aloha*
- *Khodahafez* خداحافظ
- Tạm biệt
- Proshchay Прощай
- Lā ќxn ลาก่อน
- *Zàijiàn* 再见
- *Paalam filipino*