English Technical Writing

Gerry Rau
Fall 2023 (112-1)
Class 8

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1

Feedback

2

2

Endnote

- Endnote is extremely helpful

3

3

Component Analysis Assignment

4

4

Improved

- All improved from 'Writing a claim' and last week

5

5

Topic sentence

- "Topic sentence with component markers"
  - Topic sentence = first (usually) sentence in a paragraph
  - If you have examples from several sentences, not all can be the 'topic sentence'
- In good writing, the main component of the paragraph will be clear by looking only at the topic sentences
  - Except in Testing (multiple components/paragraph)

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Text within table

- Usually better to left align only (not both/justify)

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Page limit for final description

- 20 page maximum
  - 2 sections still to be added
- May require
  - removing blank space,
  - changing spacing (do not snap to grid),
  - reducing the number or details of examples of components (keep the clearest)

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Visualizing your Work




Work Time	Graphics Types and Locations	Good Tables and Titles	Assignment

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Work Time

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New partners

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Comparison

- You have to compare your design with previous designs

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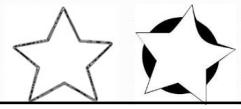
Comparison

- Take one paper, do not show it to anyone else
- Everyone has the same first image
- One other person has the same second image
- You must find that person by comparing your images – how is the second different from the first?
- Do not show the other person your image until you are sure the images are the same



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New Partners

- What is good about your description so far?
- What could be improved?

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Things to look for

- Look at one another's homework, my comments
  - Help one another improve
- Look for Track changes as well as Comments
  - Blank comment = spelling/spacing/punctuation/etc. or refer to previous comment on same problem
- Table order
  - Tables should be in the order mentioned in the text

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Present research

8.1-4

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Evaluate your Understanding

(1) Why does science tend to switch suddenly from past to present evidence at the beginning of the Methods division, whereas the two may overlap extensively in the Process division in engineering?

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Using present research for support

Prepared by: Chieh Deng

Modified by: Gerald Rau

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Transitions

Evidence from current research

- How sharp is the transition between past and present research?
  - Sharp, uniform location in science (between Introduction and Method)
  - Not that clear in engineering (within Process somewhere)
- Where can you find transitions most often?
  - Between framework and research details
  - Marker like “we propose” or “in this paper”
- Where should I look (decreasing clarity)
  - Beginning of section, first sentence (In this section we …)
  - Beginning of subsection, first sentence (We next describe …)
  - Beginning of paragraph, first sentence (Building on this, we …)
  - Hidden within a paragraph
  - No marker between old and new (Common in math, extension)

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Evaluate your Understanding

(2) What is the purpose of highlighting examples or equations with numbers or bullets?

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Present support

Evidence from current research

Examples Equations

Data Collection

Data

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Examples and Equations

Evidence from current research

Examples Equations

- Numbered or bulleted examples or **equations**

erature. The effective capacitance of the periodic arrangement of capacitive strips shown in Fig. 1(a) can be calculated using the following formula [47]:

$$C = \epsilon_0 \epsilon_{r,eff} \frac{2D}{\pi} \ln\left(\csc\left(\frac{\pi g}{2D}\right)\right). \quad (1)$$

where D is the unit cell size, g is the gap between adjacent capacitive strips, ϵ_0 is the free-space permittivity, and $\epsilon_{r,eff}$

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Data Collection

Evidence from current research

Examples Equations

- Numbered or bulleted examples or **equations**

Data Collection

- Details and sources of **materials**
- Details of present research design and **procedures**
- Details of new **design**, intermediate testing of parts
- Details of proof, lemmas, **mathematical argument**, algorithm
- Detailed description of data collection and **testing** procedures

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Data

Evidence from current research

Examples Equations

- Numbered or bulleted examples or **equations**

Data Collection

- Details and sources of **materials**
- Details of present research design and **procedures**
- Details of new **design**, intermediate testing of parts
- Details of proof, lemmas, **mathematical argument**, algorithm
- Detailed description of data collection and **testing** procedures

Data

- Data summary or highlight **in text**
- Data **patterns** visualized in graphics
- Data **comparison**, sometimes using statistical test results

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Evaluate your Understanding

(x) What types of graphics are found in journal articles?

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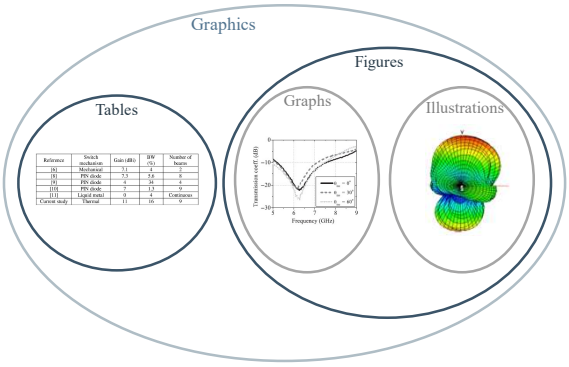
Graphics

Evidence from current research



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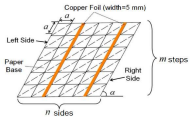
Graphics and text

Graphics



The origami pattern adopted [2] is shown in Fig. 1. Solid lines denote hills and dash lines denote valleys. The brown part is where the copper foil was located. The acute interior angle α of each rhombus is given by $\alpha = 2\pi/n$, of which, n is the number of sides of each polygon as shown in Fig. 3.

Detail ⟷ Summary

Summary ⟷ Detail

Graphics and text should supplement each other, but not just duplicate the information.

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Titles

Graphics

TABLE I
PROPOSED ANTENNA PARAMETERS

Parameter	Value (mm)	Description
L_1	182	Paper length
W_1	182	Paper width
L_2	54	Dipole length
W_2	5	Dipole width
L_3	36	Pole length
W_3	5	Pole width
L_4	26	Paper length when folded
W_4	26	Paper width when folded
H_4	26	Paper height when folded
L_5	11.5	Dipole length (the part shown when folded)
G	3	Dipole gap
t_p	0.09	Paper thickness
b_l	54	Balun length

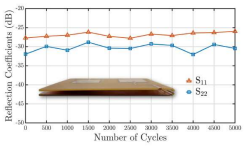

Fig. 19. Reflection coefficient (at 2.45 GHz) variation during a fatigue test.

Title above
Separate line
Small caps
Centered

Title below
Same line
Sentence
Left justify

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Table format

Graphics

- No vertical lines
- Horizontal lines
  - Top and bottom
  - Below heading
- Unit in parenthesis
- Unit for column in separate line
- Use space to separate groups

	Column 1 heading (unit)	*Column 2 heading (unit)*
Row 1 heading (unit)	Data	Data
Row 2 heading (unit)	Data	Data
Summary row heading	Summary statistic	Summary statistic

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Table layout

Graphics

- Compare numbers in a column, words across a row

Frequency (GHz)	1	2	3	4	5	6
Magnitude (dB)	9.82	12.21	3.50	10.33	6.28	11.41

Frequency (GHz)	Magnitude (dB)
1	9.82
2	12.21
3	3.50
4	10.33
5	6.28
6	11.41

For words, think about the way you read, and the answer would be clear!

For words, think about the way you read,

and the answer would be clear!

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Evaluate your Understanding

(5) What is the difference between locating and highlighting graphics?

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Exemplar presentations

• Introduction	9/26	Neo
• Process/Method	10/3	Hai
• T&C / R&D	10/17	Charles
• Citations	10/24	Tran
• Graphics	10/31	Charleen

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Locating vs. Highlighting

- Locating
  - Point to the graphic
  - "Table 1 shows the comparison between our new design and the standard design."

Common in engineering

- Highlighting
  - Point to what the reader should notice in the graphic
  - "As shown in Table 1, our new design outperformed the standard design at all values except …"

Nearly mandatory in science

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Graphics

Section 8.5

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Evaluate your Understanding

(3) How do science and engineering differ in the location and type of graphics, and why?

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Location of graphics

- Comparison of sample articles
  - Tables and Graphs common in R

	IMRD (Effects of Rainfall)			
	I	M	R	D
Tables				
Numerical			9	
Figures				
Graphs				
Illustrations				

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Location of graphics

- Comparison of sample articles
  - Tables and Graphs common in R

	IMRD (Effects of Rainfall)			
	I	M	R	D
Tables				
Numerical			9	
Figures				
Graphs				
Illustrations	Map			

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Location of graphics

- Comparison of sample articles
  - Tables and Graphs common in R or T

	IMRD (Effects of Rainfall)				IPTC (Voronoi Neighbors)			
	I	M	R	D	I	P	T	C
Tables								
Numerical			9					
Figures								
Graphs							11	
Illustrations	Map							

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Location of graphics

- Comparison of sample articles
  - Tables and Graphs common in R or T
  - Far more illustrations in I, P of IPTC

	IMRD (Effects of Rainfall)				IPTC (Voronoi Neighbors)			
	I	M	R	D	I	P	T	C
Tables								
Numerical			9					
Figures								
Graphs							11	
Illustrations	Map				2	5		

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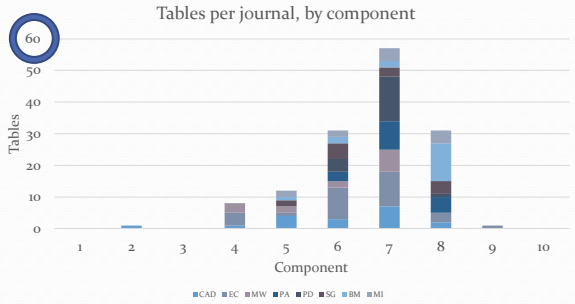
Tables in 40 IEEE articles



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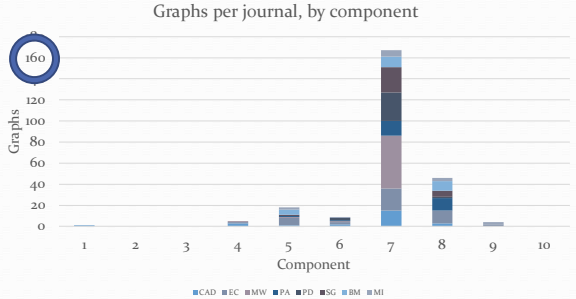
Graphs in 40 IEEE articles



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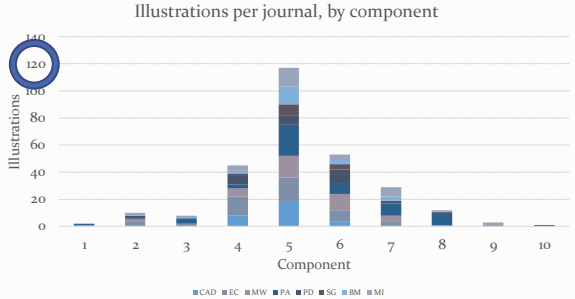
Illustrations in 40 IEEE articles



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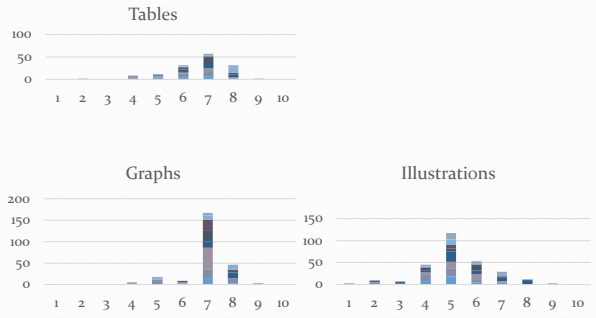
Graphics in 40 IEEE articles



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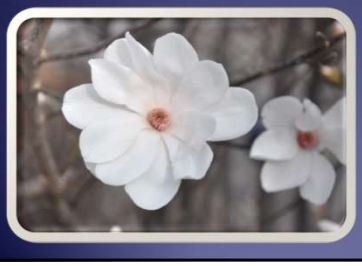
Good Tables

Section 24.3



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Good Numerical Table

Natural direction to compare numbers

Table 1
Array Size and Number of Stations

Name		Smallest Station Separation (m)	Largest Station Separation (m)	Number of Stations
TCU062	*S* array	12.5	43.3	6
	M array	25.0	86.6	6
	L array	106.7	449.4	6
TAL001	*S* array	12.5	43.3	7
	M array	25.0	141.6	7
	L array	69.5	237.5	6
	X array	317.4	1192.1	6
TAL002	*S* array	10.0	34.9	7
	M array	19.8	61.2	7
	L array	84.0	227.6	7
TCU067	*S* array	21.7	40.4	5
	M array	35.0	84.0	6

Space guides reading

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Good Numerical Table

- Vertical (columns)
  - Quantities you want to compare
    - Allows quick impression of size based on first digit
  - Often results
- Horizontal (rows)
  - Categories to be compared, in logical order
    - Ascending, descending, sequential, alphabetical
  - Often treatments

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Table Formatting

- Unit on last line of Header, in parentheses
- Round data to the same number of decimal places
  - Or significant digits
- Do not split words
- Eliminate blank space

Separation

- Fit the column size of journal
  - See Instructions to Authors

Table 1
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TCU067	*S* array	21.7	40.4	5
	M array	35.0	84.0	6

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Table Dividing Lines

- No vertical dividing lines
  (Historical reason – difficulty of typesetting)
  - Occasionally between Row Headings and Data
  - Use space instead
- Few horizontal dividing lines
  1. Table Title /Column Headings
  2. Column Headings /Data
  3. Data /Summary
  4. Table /Footnotes or bottom

(No summary)

Table 1
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TCU067	*S* array	21.7	40.4	5
	M array	35.0	84.0	6

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Sample Table

Good:
Horizontal lines
(Units)
Align on decimal

TABLE II. Discrete relaxation spectra for samples I and II, respectively, at $T=25$ °C.

i	λ_i (s)	Sample I G_i (Pa)	Sample II G_i (Pa)
1	0.003	1719	3224
2	0.01	212.3	4.4
3	0.03	558.4	532.3
4	0.10	556.0	276.1
5	0.30	583.4	411.9
6	1.0	775.7	391.5
7	3.0	542.9	507.8
8	10.0	721.9	533.9
9	30.0	495.6	615.1
10	100	8.1	377.8
11	300	2.3	69.4
12	1000	0.1	0.1

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Graphics problems

- File on ECourse2

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What could be improved?

Too many lines!

TABLE I
PERFORMANCE OF ABSOLUTE DISTANCE DETECTION

Reference distance (Feet/cm)	Beat Freq. (Hz)	Measured distance (cm)	Standard error (cm)
3.0/91.44	3793.5	84.84	-6.60
3.5/106.68	3866.0	101.73	-4.95
4.0/121.92	3914.3	120.68	-1.24
4.5/137.16	4010.9	135.51	-1.65
5.0/152.40	4083.4	152.40	0.00
5.5/167.64	4131.8	173.79	6.15
6.0/182.88	4228.4	186.11	3.23
6.5/198.12	4349.2	193.92	-4.20
7.0/213.36	4397.5	215.35	1.99
7.5/228.60	4445.9	236.76	8.16
8.0/243.84	4566.7	244.59	0.75

Align units

Why feet?

Explains odd distances in cm

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What could be improved?

Different precision

Table 1. Comparison of properties for branched structure and its corresponding turn-on field: literature values results reported in the present work.

Description	E_{on} (V μm^{-1})	β (cm^{-1})	Ref.
CdS branched arrays	4.3	1160	[11]
Branched ZnS	2.39	3100	[12]
6-Fold hierarchical Zn/ZnO	8.5	3490	[13]
Cactus-like Ga_2O_3	12.6	38.2	[14]
Branched ZnS–In core shells	5.43	1.6 × 103	[15]
Nanoneedles ZnO	3.20	3.1 × 104	Present
Cacti-like ZnO	2.13	4.7 × 104	work

Exponent, Alignment

Not data (col. 1) Order?

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What could be improved?

(Units) in parenthesis, no "in".

Table 3
Performance for the routing table of 120,629 prefixes (Oix-120k), where the proposed multiway and binary prefix searches are denoted by MPS and BPS, and suffix "–16" denotes the usage of a16-bit segmentation table

Scheme	Worst case # of memory references	Search time (T_s) in μs	Update time (T_u) in μs	Memory (Mem) in KB
BTrie-16	17	0.47	0.84	2447
C-16-x [7]	3	0.17	9.89	1147
BS-Length [25]	5	0.35	210	2315
SFT [5]	12	0.21	1454	650
BRS-16 [12]	4	0.28	9.56	1104
MRS-16 [12]	4	0.23	29.3	4695
BPS-16	4	0.16	6.05	601
MPS-16	3	0.17	17.82	954
PBOB-16 [13]	10	0.34	0.97	3550
PST-16 [14]	10	0.44	1.58	7932
CRBT-16 [19]	10	0.65	4.20	19,535

Why are proposed schemes in middle?

Organize!

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What could be improved?

Put as "unit"

Units as second header line

Table 4
Comparison of BN inference time (unit: sec).

Target BN	File I/O	Junction tree	Probability propagation
BNs with 5 parents	0.0765	262.1936063	5.3670 21875
BNs with 4 parents	0.054546875	37.992184	2.6017469
BNs with 3 parents	0.04051875	1.1575344	0.0795438
BNs with 2 parents	0.02724375	0.3257094	0.009025
BNs with 1 parent	0.012853125	0.3380156	0.004125
Tree structured BN	0.002025806	–	0.0001968

Unnecessary

Align on decimal

Unnecessary precision, report all to same level

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What could be improved?

Is comparison between simulation/expt. relevant?

Not same names Comparison of what?

TABLE I
COMPARISON BETWEEN METAL-SLAB AND METAL-GRATING

	Simulation		Experiment	
	ΔP/Δn	resolution	ΔP/Δn	resolution
metal film	28.1∼34.9	5.9∼7.1 ×10^{-6}	14.2	1.4 ×10^{-5}
metallic grating	210∼234	8.5∼9.4 ×10^{-7}	85.6∼90.6	2.3∼2.4 ×10^{-6}

Tilde instead of dash: Not all journals accept

Exponents: Same, in unit (header)

No vertical lines

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Sample Table

TABLE 1. Dominating contribution ($|c_{ia}|^2$) for Δq equal to 1 and 3 of the L mode of cumulenes, polyynes, Na chains, and dimerized Na chains for different numbers of atoms n.

	Cumulenes		Polyyenes		Na chains		Dimerized Na chains	
	Δq=1	Δq=3	Δq=1	Δq=3	Δq=1	Δq=3	Δq=1	Δq=3
n= 8	0.94	0.01	0.06	0.99	0.06	0.77	0.77	0.16
n=16	0.95	0.02	0.1	0.99	0.09	0.56	0.56	0.43
n=24	0.93	0.02	0.16	0.98	0.16	0.57	0.57	0.42

Use "n" as header

0.10 or? Same level of precision

Leave more space between types than 1/3

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Sample Table

Table 1. Levels of εdAdo, εdCyd, and 1,N^2-εdGuo in Human Placental DNA Hydrolyzed by Methods A, B, and C

Capitalize headers

adducts levels (adducts/ 10^8 nucleotides),[a,b] mean ± SD (RSD, %)

Cluttered

	εdAdo	εdCyd	1,N^2-εdGuo
method A	27.8 ± 0.2 (0.6%)	44.4 ± 0.7 (1.6%)	8.1 ± 0.2 (3.0%)
method B	20.7 ± 1.0 (4.6%)	28.6 ± 0.8 (2.7%)	8.2 ± 0.4 (4.7%)
method C	23.3 ± 0.9 (4.1%)	34.4 ± 3.9 (11%)	6.5 ± 0.7 (11%)

[a] Each experiment started with 30 μg of human placental DNA, and an equivalent of 6 μg of DNA hydrolysate was subjected to the nanoLC-NSI/ MS/ MS analysis. [b] Adduct levels are presented as mean ± standard deviation (SD) from triplicate experiments. The percentage standard deviation (RSD) is expressed in parentheses.

b repeats information in header

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Sample Table

Oops!

Table 1
The numbers of prefixes in different segment formats

Format	Tree level	n = Number of entries in the segment			Block index/16-bit prefix	Port
		CLS	32	64		
0	0	0	0	0	0	Default port #
0	0	1	1	1	Prefix	Port #
1	1	$2 - k_1$	2–10	2–21	Index	Default port #
2	2	$k_1 + 1$–CLS	11–32	22 ∼ 64	Index	Default port #
3	2	CLS + $1 - (k_1 + 1)^2 - 1$	33–120	65–483	Index	n/a
4	2	$(k_1 + 1)^2 - (k_2 + 1)(k_1 + 1) - 1$	121–186	484–725	Index	n/a
5	3	$(k_2 + 1)(k_1 + 1) - (k_1 + 1)^3 - 1$	187–1330	726–10,647	Index	n/a
6	3	$(k_1 + 1)^3 - (k_2 + 1)(k_1 + 1)^2 - 1$	1331–2057	10,648–15,971	Index	n/a

CLS = cache line size in bytes, $k_1 = \lfloor CLS/3 \rfloor$, $k_2 = \lfloor CLS/2 \rfloor$.
n/a = Not applicable, $\lfloor x \rfloor$ = floor of value x.

Consider centering columns or?

Last 2 columns could be in text, poor spacing

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Sample Table

Table 1 Raw fluorescence signal, measured in photo multiplier tube counts. The fluorescence intensity is measured from QDs on the PC both when it is in resonance and out of resonance with the incident beam. After subtracting the background in both cases, the enhancement due to the enhanced near-fields (enhanced excitation) and the enhancement due to coherent scattering (enhance extraction) are determined.

	Signal		Background		Enhancement
	On PC (S_1)	Off PC (S_2)	On PC (B_1)	Off PC (B_2)	($S_1 - B_1$)/($S_2 - B_2$)
$\theta = 11.2°$	10,160.93 ± 362.92	131.78 ± 2.91	336.03 ± 9.14	41.52 ± 1.13	106.89 ± 4.09
$\theta = 0°$	705.31 ± 8.80	72.52 ± 0.93	25.33 ± 0.89	21.04 ± 0.48	13.21 ± 0.26

Make sure all type is readable at the scale it will be printed – this was in one column, tiny

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Sample Table

Column header or row headers?

Method / Potential / c-val	LDA Si LDA	LDA Si-TM LDA	GW Si-TM LDA	GW Si LDA	GW Si HF	GW Si-2p HF	GW (Refs. 16 and 44) FP-LMTO HF	GW (Ref. 42) FLAPW	GW (Ref. 6) AE-PP	Expt. (Ref. 34)
Γ_{1v}	−11.97	−11.97	−11.62	−11.75	−11.85	−11.87				−12.5±0.6
$\Gamma_{25'v}$	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.0
Γ_{15v}	2.52	2.53	3.23	3.17	3.17	3.16	3.12	3.20	3.24	3.40
$\Gamma_{2'v}$	3.20	3.10	3.82	4.04	4.01	3.97				4.23
X_{1v}	−7.82	−7.81	−7.60	−7.68	−7.76	−7.77				
X_{4v}	−2.86	−2.85	−2.83	−2.88	−2.91	−2.90		−2.92		
X_{1c}	0.60	0.62	1.33	1.19	1.15	1.14	0.98	1.19	1.18	1.25
X_{3c}	9.98	9.94	10.44	10.54	10.64	10.61				
$L_{2'v}$	−9.63	−9.62	−9.37	−9.46	−9.55	−9.59				−9.3±0.4
L_{1v}	−7.00	−6.99	−6.78	−6.87	−6.94	−6.94				−6.7±0.2
L_{3v}	−1.20	−1.20	−1.20	−1.22	−1.23	−1.23		−1.23		−1.2±0.2
L_{1c}	1.43	1.41	2.10	2.10	2.07	2.04		2.12		2.4±0.15
L_{3c}	3.29	3.31	4.05	3.93	3.93	3.92				

Can anyone figure out what this is trying to show?

60

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Sample Table

TABLE I
SPECIFICATIONS OF THE PV ARRAY

PV array	Rated power	600W
	Open circuit voltage	150V
	Short circuit current	7A
	Connection	4 (Each 150W)

Common form of table, although could be text

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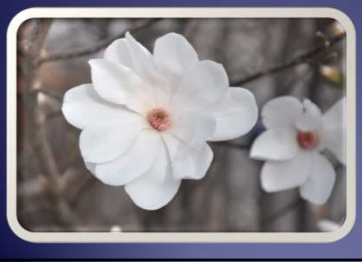
Graphics
Table Titles

Section 24.3



62

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Title Formats

1

TABLE I
PERFORMANCE OF ABSOLUTE DISTANCE DETECTION

2

Table 1. Comparison of properties for branched structure and its corresponding turn-on field: literature values results reported in the present work.

1	2
CENTERED	Left aligned. Title on same line.
TITLE ON FOLLOWING LINE	
SMALL CAPITALS	Sentence case
Roman numeral	Arabic numeral
No period after number	Period after number.
Title short, no period	Title is long, ends with a period.

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Title Formats

- Compare the title/caption formats in your exemplar with someone else (preferably a different field)

- Title centered over table or left aligned?
- Title on same line as number or following line?
- Title in CAPITAL/SMALL CAPITAL or Capital/small
- Arabic or Roman numerals? (2 or II)
- Punctuation after number? (2 or 2. or 2:)
- Period at end of title/caption?
- Same for Table and Figures or different?

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Table Title

- General principles
  - Self-sufficient (summarize what the Table shows)
  - First word (only) capitalized
    - Exceptions: pH, mRNA, etc.
    - Exceptions: SE, DNA
    - Exceptions: Sometimes 'title case' with small caps
  - Positioned above the Table
    - (Table, Title, Top)

- Follow exemplar articles for number of words, format
  - Usually brief noun phrase, no verb

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Exercises in this chapter

- Exercise 8.1 Where are the break points past/present?
- Exercise 8.2 Where are the equations?

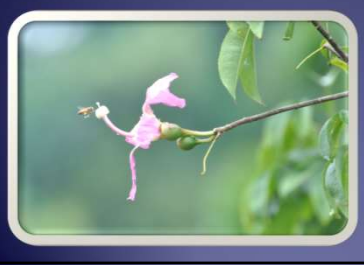
- Exercise 8.3 Where are the graphics?
  - Table(s) – All articles, one or three tables

- Summary: where you find support from present work
  - Summarize any important information from 8.1, 8.2
  - Point to table(s) for 8.3

66

66

Assignment



67

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1 Turn in

- Nothing
- Complete descriptions due following week (April 25)

68

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Complete description (Nov. 12)

- Title and author
- Overall structure (Exercises 2.1, 3.2)
- Component analysis (what is present, where, markers)
  - Introduction division (Exercise 4.1)
  - Method or Process division (Exercise 5.1)
  - R&D or Testing and Conclusion divisions (Exercise 6.1)
- Support
  - Past research (Exercise 7.1)
  - Present research (Exercises 8.1-4, 24.1-3 – as applicable)
- References and citations

Formatted well (headers, titles, table format, …)
Remove Track changes, Comments

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2 Bring

- Draft of complete descriptions
- One final check before turning in
  - Partner
  - Questions for me or TA

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3 Read

- Chapter 16 Oral presentations

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