Student's Name:

University of Dayton

DEPARTMENT OF COMPUTER SCIENCE

MID-TERM EXAM

Class:	**CPS499/563 – Data Visualization – Spring 2020**
Instructor:	**Dr. Tam Nguyen**
Date:	
Student's Name:	
Student's Email:	

Plagiarism and cheating will not be tolerated. Copying the available code, chart, or figure from Internet sources is not allowed. Any student caught plagiarizing or cheating will not pass the class.

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Instruction (Very Important)

- ***This mid-term exam is due:*** Mar 30, 2020 **2:25 PM**. You have 50 minutes for the exam and 20 minutes for your submission.
- You provide your answer in a separate doc/docx/txt/pdf file and you submit it as an assignment.
- Name your submission file after your UD username. For example: if your UD email is abc1@udayton.edu, then your UD username is **abc1**, and your submission filename is **abc1.doc** (or **abc1.docx**, **abc1.txt**, or **abc1.pdf**). Your submission will be ungraded if its filename is in the wrong format.
- Write your name on the first page of your answer script.
- There is no teamwork in the exam.
- Do not leave any question unanswered.

Student's Name:

Question 1

Given the data below:

Ice Cream Data	
Temperature °C	**Ice Cream Sales**
14.2°	$215
16.4°	$325
11.9°	$185
15.2°	$332
18.5°	$406
22.1°	$522
19.4°	$412
25.1°	$614
23.4°	$544
18.1°	$421
22.6°	$445
17.2°	$408

What type of visualization would you use for the below data? And explain why. (10 points)

Please plot the visualization chart/graph that you choose for the given data in Excel. (10 points)

Student's Name:

Question 2

Following are the population and demographic data based on analysis of the Census Bureau's American Community Survey.

Location	Children 0-18	Adults 19-25	Adults 26-34	Adults 35-54	Adults 55-64	Adults 65+	Total
Alabama	1128300	419500	554400	1192600	646800	811000	4752600
Alaska	191100	62200	93400	182800	94100	85500	709100
Arizona	1706300	645900	841100	1702900	862200	1245900	7004300
Arkansas	728600	255200	345400	722800	380200	489100	2921300
California	9324800	3594300	5299700	10212700	4737800	5576600	38745900
Colorado	1321800	495000	771700	1471200	700700	794800	5555200
Connecticut	767700	291600	387100	918600	510400	590900	3466300
Delaware	205800	76700	109700	233100	134400	177900	937700
District of Columbia	130200	64400	141400	179400	69900	82600	667900
Florida	4397300	1680500	2401900	5240300	2829800	4293700	20843500
Georgia	2610600	901500	1262600	2743500	1268300	1426400	10212800
Hawaii	312100	98400	167600	340100	178500	258100	1354800
Idaho	462600	150600	203200	414500	212900	275900	1719600
Illinois	2965600	1103100	1543200	3251000	1649800	1925700	12438400
Indiana	1609500	585500	762900	1648200	865400	1015400	6487100
Iowa	754700	272000	352500	747900	411700	517900	3056800
Kansas	727700	260300	325200	688300	371700	441600	2814700
Kentucky	1024400	388100	501600	1104200	591000	711100	4320300
Louisiana	1142700	408800	549800	1125800	592700	699600	4519300
Maine	250700	93700	140400	332500	214300	267900	1299500
Maryland	1378800	491800	712200	1573200	808400	906300	5870800
Massachusetts	1412700	581700	873100	1753300	936100	1103100	6659900
Michigan	2228200	890600	1151100	2431200	1392900	1676000	9770000
Minnesota	1336600	458400	685900	1398200	752600	857200	5489000
Mississippi	735000	262100	326400	717600	377300	461000	2879400
Missouri	1405600	519900	714300	1470900	823200	1000600	5934500
Montana	232800	84500	118800	247800	152000	198000	1034000
Nebraska	488400	161600	224800	460200	242200	291700	1868900
Nevada	707300	251100	386200	791200	373600	473900	2983400
New Hampshire	266500	106400	146700	341300	212100	237200	1310300
New Jersey	2025600	725800	1002400	2365900	1205500	1403100	8728300
New Mexico	499900	186400	239200	484500	271000	364300	2045300
New York	4182800	1648400	2552500	4945500	2573600	3114200	19016900
North Carolina	2383600	848600	1179600	2653900	1330700	1648100	10044400
North Dakota	176400	78600	99300	170000	96800	109600	730600
Ohio	2662700	973600	1345900	2850100	1597400	1926100	11355900
Oklahoma	987400	333200	479300	932800	484900	598400	3816100
Oregon	898000	347300	531100	1066100	539100	729300	4110800
Pennsylvania	2720200	1027000	1475100	3119700	1794800	2251300	12388100

Student's Name:

Rhode Island	207500	92700	128900	262200	147700	175000	1014000
South Carolina	1151000	423000	558000	1243300	673500	880900	4929800
South Dakota	219200	77100	96400	200300	116700	139000	848700
Tennessee	1557800	571500	788700	1709100	884500	1074700	6586400
Texas	7705100	2642800	3631000	7333600	3200800	3510700	28024000
Utah	966500	337300	403600	756700	298400	343200	3105900
Vermont	117000	48400	68700	151600	95700	119200	600600
Virginia	1932900	702300	997000	2167600	1086400	1295800	8182100
Washington	1710100	622000	1023700	1913600	955800	1142800	7368000
West Virginia	373600	143300	184300	443100	255300	352700	1752300
Wisconsin	1309600	489400	644200	1446800	817100	955800	5662800
Wyoming	135900	46600	67500	136700	78800	94900	560300

Which chart do you choose to plot the given data? Explain why. (10 points)

Student's Name:

Write MATLAB code to visualize your chosen chart. (20 points)

Display the chart by running your MATLAB code. (10 points)

Student's Name:

Question 3

"Computer science is the study of processes that interact with data and that can be represented as data in the form of programs. It enables the use of algorithms to manipulate, store, and communicate digital information. A computer scientist studies the theory of computation and the design of software systems. Its fields can be divided into theoretical and practical disciplines. Computational complexity theory is highly abstract, while computer graphics emphasizes real-world applications. Programming language theory considers approaches to the description of computational processes, while software engineering involves the use of programming languages and complex systems. Human–computer interaction considers the challenges in making computers useful, usable, and accessible. As a discipline, computer science spans a range of topics from theoretical studies of algorithms and the limits of computation to the practical issues of implementing computing systems in hardware and software."

Draw a word cloud from the text above with Tableau. (20 points)

Student's Name:

Question 4

Below is the US map

And the average temperature of each state is shown in the following table

State	Abbreviation	Average Temperature (°F)
Alabama	AL	62.8
Alaska	AK	26.6
Arizona	AZ	60.3
Arkansas	AR	60.4
California	CA	59.4
Colorado	CO	45.1
Connecticut	CT	49
Delaware	DE	55.3
Florida	FL	70.7
Georgia	GA	63.5
Hawaii	HI	70
Idaho	ID	44.4
Illinois	IL	51.8
Indiana	IN	51.7
Iowa	IA	47.8
Kansas	KS	54.3
Kentucky	KY	55.6
Louisiana	LA	66.4
Maine	ME	41
Maryland	MD	54.2

Student's Name:

Massachusetts	MA	47.9
Michigan	MI	44.4
Minnesota	MN	41.2
Mississippi	MS	63.4
Missouri	MO	54.5
Montana	MT	42.7
Nebraska	NE	48.8
Nevada	NV	49.9
New Hampshire	NH	43.8
New Jersey	NJ	52.7
New Mexico	NM	53.4
New York	NY	45.4
North Carolina	NC	59
North Dakota	ND	40.4
Ohio	OH	50.7
Oklahoma	OK	59.6
Oregon	OR	48.4
Pennsylvania	PA	48.8
Rhode Island	RI	50.1
South Carolina	SC	62.4
South Dakota	SD	45.2
Tennessee	TN	57.6
Texas	TX	64.8
Utah	UT	48.6
Vermont	VT	42.9
Virginia	VA	55.1
Washington	WA	48.3
West Virginia	WV	51.8
Wisconsin	WI	43.1
Wyoming	WY	42

You are required to plot a heatmap from the given data. Please clearly state the tool that you use to plot the heatmap (5 points).

Student's Name:

Visualize the heatmap. (15 points)