

## BA 640 Assignment #10

**Due July 21 by 11:59 pm** (submit your .py file via the “Assignment #10” Canvas link.)

Create a Python program that does the following.

1. Create and display a data frame with the following attributes: (10 points)
  - Contains four rows and six columns
  - The data in the data frame is made up of random numbers between 10 and 99
  - The data frame columns are labeled ‘A’, ‘B’, ‘C’, ‘D’, ‘E’, and ‘F’
  - The data frame indices are ‘Jane’, ‘Mary’, ‘Bob’, and ‘Mark’

Format you output as shown in the example below (include the header). Your numbers will be different.

Data frame of random numbers						
	A	B	C	D	E	F
Jane	37	54	28	34	12	84
Mary	55	77	95	12	34	60
Bob	45	13	25	48	41	55
Mark	70	47	23	33	71	39

2. Print the row and column totals of the data frame created for question 1. (15 points)

Format you output as shown in the example below (include the header). Your numbers will be different.

Data frame row totals	
Jane	249
Mary	333
Bob	227
Mark	283
Data frame column totals	
A	207
B	191
C	171
D	127
E	158
F	238

3. Print the mean of the column totals calculated for question 2. (15 points)

Format you output as shown in the example below. Your numbers will be different.

Mean of data frame row totals: 273.0
Mean of data frame column totals: 182.0

Use the data in **salary.csv** file for questions 4 through 7 of the assignment. The file contains salary data for individuals employed by the city of San Francisco from 2013 to 2019.

4. Print the average salary of city workers by year. (15 points)

Format your output as shown in the example below (include the header). Your numbers will be similar to those below.

Average salary by year	
year	salary
2013	91795
2014	90875
2015	92148
2016	94561
2017	77807
2018	95647
2019	88052

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5. Print the average salary of city workers by organization within year. (15 points)

Format your output as shown in the example below (include the header). Your numbers will be similar to those below.

Average saillary by organization within year		
year	organization	salary
2013	Community Health	86157
	Culture & Recreation	65813
	General Administration & Finance	84865
	General City Responsibilities	42463
	Human Welfare & Neighborhood Development	72930
	Public Protection	121774
2014	Public Works, Transportation & Commerce	84765
	Community Health	86002
	Culture & Recreation	66193
	General Administration & Finance	84624
	General City Responsibilities	58922
	Human Welfare & Neighborhood Development	70239
2015	Public Protection	119505
	Public Works, Transportation & Commerce	84695
	Community Health	87800
	Culture & Recreation	67553
	General Administration & Finance	87308
	Human Welfare & Neighborhood Development	74657
2016	Public Protection	121622
	Public Works, Transportation & Commerce	84781
	Community Health	90744
	Culture & Recreation	68562
	General Administration & Finance	88777
	General City Responsibilities	25844
2017	Human Welfare & Neighborhood Development	76725
	Public Protection	123151
	Public Works, Transportation & Commerce	87952
	Community Health	75450
	Culture & Recreation	58234
	General Administration & Finance	75048
2018	General City Responsibilities	25844
	Human Welfare & Neighborhood Development	62622
	Public Protection	97958
	Public Works, Transportation & Commerce	72975
	Community Health	93414
	Culture & Recreation	68169
2019	General Administration & Finance	93004
	General City Responsibilities	95453
	Human Welfare & Neighborhood Development	78616
	Public Protection	120409
	Public Works, Transportation & Commerce	90566
	Community Health	85686
	Culture & Recreation	65008
	General Administration & Finance	84832
	General City Responsibilities	87211
	Human Welfare & Neighborhood Development	73127
	Public Protection	111475
	Public Works, Transportation & Commerce	83533

6. Print the average salary of fire fighters and the number of fire fighters in the city by year. (15 points)

Format your output as shown in the example below. Your numbers will be similar to those below.

Average salary and total number of firefighters by year		
year	salary	count
2013	154787	1514
2014	145226	1586
2015	144375	1578
2016	142182	1680
2017	106058	1730
2018	129527	2665
2019	117382	2582

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7. Create a pivot table that shows the mean salary of each job category in the city by year and print the pivot table.  
*Your numbers will match those below. (15 points)*

	2013	2014	2015	2016	2017	2018	2019
<b>jobCategory</b>							
Administrative & Mgmt (Unrep)	182328	169316	274702	203347	185554	231353	251842
Administrative Secretarial	81619	81778	85875	84308	70085	86583	82716
Administrative-DPW/PUC	112219	120622	128717	127742	98432	134926	113432
Administrative-Labor & Trades	122849	124993	125738	129504	117178	116955	111292
Agriculture & Horticulture	63705	63428	64873	66833	54887	67348	52015
Airport Operation	82758	80802	83513	81831	65270	86542	69527
Appraisal & Taxation	70170	74207	77195	76672	64253	76889	65409
Budget, Admn & Stats Analysis	79009	77025	77248	78551	65492	79836	73681
Clerical, Secretarial & Steno	58181	57898	58481	60392	49377	60914	52864
Community Development	73965	75618	75791	81553	67200	81234	73730
Computer Operatns & Repro Svcs	58977	57541	58151	59379	50586	62012	54691
Construction Inspection	98395	98075	92703	92380	76996	93845	84223
Construction Project Mgmt	120933	122159	123901	123280	106833	124139	114563
Correction & Detention	109473	109237	114507	122239	100668	120345	109461
Dietary & Food	51805	51070	53183	55186	47973	56526	53564
Emergency Coordination	0	0	0	0	0	94956	82482
Emergency Services	59590	79167	80331	89122	69276	0	0
Energy & Environment	89033	86166	88993	92254	75435	94060	82408
Fire Services	160234	152724	151145	151427	112878	134637	127411
Health & Sanitation Inspection	98502	98235	89076	98278	78622	99090	90291
Hospital Administration	64456	63974	65249	67674	54975	68144	61187
Housekeeping & Laundry	54674	55092	56591	58071	47613	60143	54876
Human Services	74387	71182	75723	77714	62637	78925	72664
Information Systems	90461	99316	100791	101233	84440	107293	98486
Journeyman Trade	92745	92778	95349	99686	82615	102053	92650
Lab, Pharmacy & Med Techs	85399	85431	87368	90730	74311	89860	84195
Legal & Court	115015	114915	118096	121561	99638	124268	114367
Library	58362	57937	58740	58677	53404	58595	60534
MTA Operations	0	0	0	0	0	69547	65508
Management	127432	125809	130694	133645	109128	140130	127346
Med Therapy & Auxiliary	68887	69670	71048	69897	59916	73317	65852
Medical & Dental	127862	125842	139911	148365	122782	156239	135413
Museum & Cultural Affairs	61361	63006	67145	68441	56406	68049	64181
Nursing	97308	97058	98556	103390	85500	105972	97241
Park & Zoo	54404	54487	54550	54945	46037	57186	54749
Payroll, Billing & Accounting	66944	66801	68955	69800	60450	73684	68575
Personnel	73250	70378	70689	74720	62555	76385	71611
Police Services	130811	129257	131721	130274	106461	134093	122640
Port Operation	111368	113104	105407	102366	90435	110592	109445
Probation & Parole	83305	83740	89131	92181	74320	81161	76877
Professional Engineering	101639	99344	99439	101361	82864	100969	92834
Property Administration	90513	95139	92707	95703	85026	99204	73650
Protection & Apprehension	74134	75489	78796	82572	65395	78265	68745
Pub Relations & Spec Assts	68008	65766	68523	67256	55898	66333	65278
Public Health	90746	90152	92987	90673	77066	94096	84626
Public Safety Inspection	102559	104599	105071	107379	84918	109690	96692
Public Service Aide	34557	34018	35545	37715	36407	36727	34645
Purchasing & Storekeeping	67760	68753	68551	70658	56797	72700	69235
Recreation	55225	55348	56971	58424	47569	53851	52145
Revenue	64132	65083	67486	68603	57450	72345	59629
SF Redevelopment Agency	0	0	52454	68980	55744	0	0
SF Superior Court	85239	82699	83177	84455	66687	0	0
Semi-Skilled & General Labor	60517	61451	62006	62900	53426	63647	59697
Skilled Labor	81297	78604	77960	81514	66506	86272	79535
Street Transit	80377	79747	77512	79984	66759	86061	81779
Sub-Professional Engineering	63277	64552	63283	66610	57067	64068	57126
Supervisory-Labor & Trade	104023	103338	109043	112869	91439	111535	105093
Unassigned	0	0	0	0	0	260856	202323
Untitled	0	0	0	0	0	91610	81874