

Name: \_\_\_\_\_

PID: \_\_\_\_\_

- You may use a calculator and two self-made formula sheets. You must turn in your formula sheet with your exam. Please make sure your name is on your formula sheet.
- Show all work to receive credit
- You may not have a cell phone visible at any point during the exam.
- Collaboration with other students during any part of this exam will result in a 0 exam score.
- When you have completed the exam, you must turn in this exam AND your formula sheet, and quietly leave the room.

I have read and understand the  
above instructions and statements  
regarding academic honesty: \_\_\_\_\_

**SIGNATURE**

1. Aunt Liz wins \$150,000 in the lottery. She invests all this money in a CD with a 4.5% APR and a 5-year maturity date.

(a) (3 points) Calculate how much money will be in the account after 5 years supposing there are no withdrawals?

(b) (2 points) How much interest did she make in 5 years?

2. (5 points) Noal is taking MTH 102. The labs are worth 45%, the project and midterm are both worth 15% and the final exam is worth 25%. These are the scores that Noal has earned:

Labs: 90%

Midterm: 80%

Project: 92%

Calculate what Noal would need to get on the final exam to earn a 4.0, assuming that scores are rounded up so 89.5% is the minimum needed to earn it (Hint: Construct a table)

**Final Exam:** \_\_\_\_\_ %

3. The following table lists the domestic gross of three films with the year they were released and the CPI of that year.

Year	Film	Domestic Gross	CPI
1987	Fatal Attraction	\$156,645,693	113.6
1995	Apollo 13	\$173,837,933	152.4
2018	Mission: Impossible - Fallout	\$220,159,104	250.5

- (a) (5 points) By adjusting for inflation, rank the three films in order of most to least successful at the box-office.

- 1.
- 2.
- 3.

- (b) (3 points) The 1976 film A Star Is Born starring Barbra Streisand grossed approximately \$80 million domestically whereas the 2018 remake starring Lady Gaga grossed approximately \$215 million domestically. We know the CPI of 2018 from the table above. What would the CPI in 1976 need to be for the two films to be equally successful at the box office?

4. (5 points) In 1972, a Boeing 747 was worth \$24 million. In 2018, a Boeing 747 is worth \$418 million. The CPI for 1972 and 2018 are CPI was 41.8 and 250.5 respectively. Fill in the information below:

Without adjusting for inflation, the Boeing 747 has had a price increase of \_\_\_\_\_%

With adjusting for inflation, the Boeing 747 has had a price increase of \_\_\_\_\_%

5. Randy has a salary of \$80,000 and paid \$12,000 in federal income taxes. Randy works 8 hours in a workday. You can assume the following facts

2018 Total US Federal Spending: \$4.2 Trillion

2018 US Population: 327 Million

2018 Interest On Debt: \$300 Billion

- (a) (3 points) What is the federal spending per person on paying interest on the debt?
- (b) (3 points) What percentage of the federal budget is spent paying interest on the US debt?
- (c) (3 points) Using this percentage, how much (in terms of dollars) of Randy's taxes go towards paying off the interest?
- (d) (3 points) What percentage of Randy's salary is spent on paying his federal income taxes?
- (e) (3 points) Using this percentage, how many minutes per workday does Randy work to pay his federal taxes?
- (f) (3 points) By using your answers to parts (b) and (d), calculate how many minutes per workday Randy works to pay off the interest on the US debt?

6. Suppose that a state has three districts and would like to use Mixed Member Proportional representation. There are three political parties in the state: the Arsenal party, the Chelsea party, and the Vardy party.

In the first vote, 2 candidates from the Chelsea party and 1 candidates from the Vardy party were elected. In the second vote for the party that best represents individual voters (state-wide results), the results were Arsenal party: 42%, Chelsea party: 32%; Vardy party: 26%

- (a) (2 points) How many representatives will be chosen?
- (b) (3 points) The 4<sup>th</sup> representative is from the \_\_\_\_\_ party. Use the table below to show your work.

Party	Goal %	Current %	% Behind
Arsenal			
Chelsea			
Vardy			

- (c) (3 points) The 5<sup>th</sup> representative is from the \_\_\_\_\_ party. Use the table below to show your work.

Party	Goal %	Current %	% Behind
Arsenal			
Chelsea			
Vardy			

- (d) (3 points) The 6<sup>th</sup> representative is from the \_\_\_\_\_ party. Use the table below to show your work.

Party	Goal %	Current %	% Behind
Arsenal			
Chelsea			
Vardy			

- (e) (3 points) Compute the percentage of representatives from each of the three parties.

Arsenal party: \_\_\_\_\_%, Chelsea party: \_\_\_\_\_%; Vardy party: \_\_\_\_\_%

7. Vini is looking to purchase a car worth \$35,000. He can secure a 4 year loan with a 8.2% APR and required monthly payments of \$900
- (a) (2 points) In the first month of the loan, Vini will pay \$\_\_\_\_\_ in interest charges and he will reduce his debt by \$\_\_\_\_\_.
- (b) (2 points) Calculate the total cost of Vini's loan.
- (c) (2 points) How much total interest does Vini pay?
- (d) (3 points) Suppose Vini wins \$12,000 in a tournament. He wants to use this money as a down payment for his car. Calculate the monthly payments required if he wishes to use the same length loan with same APR.
- (e) (2 points) Suppose instead that Vini uses this money to purchase a more expensive car. What is the most expensive car he can afford?

8. Suppose a MSU society is voting for their new president. You obtain the following preference schedule.

# Of Voters	3	13	12	24	7	20
1 <sup>st</sup> Choice	Nathan	Nathan	Dean	Dean	Lloyd	Lloyd
2 <sup>nd</sup> Choice	Dean	Lloyd	Nathan	Lloyd	Nathan	Dean
3 <sup>rd</sup> Choice	Lloyd	Dean	Lloyd	Nathan	Dean	Nathan

(a) (2 points) How many people voted?

(b) (2 points) Who wins using the plurality method?

**Plurality winner:** \_\_\_\_\_

(c) (4 points) Who is the winner using the plurality with elimination method?

**Plurality with elimination winner:** \_\_\_\_\_

# Of Voters	3	13	12	24	7	20
1 <sup>st</sup> Choice	Nathan	Nathan	Dean	Dean	Lloyd	Lloyd
2 <sup>nd</sup> Choice	Dean	Lloyd	Nathan	Lloyd	Nathan	Dean
3 <sup>rd</sup> Choice	Lloyd	Dean	Lloyd	Nathan	Dean	Nathan

(d) (4 points) By calculating the Borda points for each candidate, who wins by the Borda method?

Nathan: \_\_\_\_\_ points

Dean: \_\_\_\_\_ points

Lloyd: \_\_\_\_\_ points

**Borda winner:** \_\_\_\_\_

(e) (5 points) With the pairwise comparisons method, we consider every head-to-head matchup. The winner of a match-up receives 1 point, and the loser 0 points. If there is a tie, each will receive half a point. Fill in the table below:

Matchup	# of people who prefer		Points	
Nathan Vs Dean	Nathan:	Dean:	Nathan:	Dean:
Nathan Vs Lloyd	Nathan:	Lloyd:	Nathan:	Lloyd:
Dean Vs Lloyd	Dean:	Lloyd:	Dean:	Lloyd:

**Total points:** Nathan: \_\_\_\_\_, Dean: \_\_\_\_\_, Lloyd: \_\_\_\_\_

**Winner using pairwise comparison method:** \_\_\_\_\_

(f) (2 points) Is there a Condorcet candidate? If so, who is the Condorcet candidate?



Filing Status	Standard Deduction
Single	\$12,000
Married Filing Jointly & Surviving Spouse	\$24,000
Married Filing Separately	\$12,000
Head of Household	\$18,000

taxable income	If filing using the Single Status, the tax due is	Tax Bracket
\$0 - \$9,525	10% of taxable income	10%
\$9,526 - \$38,700	\$952.50 + 12% of taxable income over \$9,525	12%
\$38,701 - \$82,500	\$4,453.50 + 22% of taxable income over \$38,700	22%
\$82,501 - \$157,500	\$14,089.50 + 24% of taxable income over \$82,500	24%
\$157,501 - \$200,000	\$32,089.50 + 32% of taxable income over \$157,500	32%
\$200,001 - 500,000	\$45,689.50 + 35% of taxable income over \$200,000	35%
\$500,001 +	\$150,689.50 + 37% of taxable income over \$500,000	37%

9. (4 points) Nigel has an income of \$120,000. He files single status and claims \$15,000 in exemptions. Fill in the information below.

Nigel will have a taxable income of \$\_\_\_\_\_ and will owe \$\_\_\_\_\_ in federal income taxes.

Nigel is in the \$\_\_\_\_\_ % tax bracket, and his effective tax rate is \$\_\_\_\_\_ %.

10. Dan & Jon are a married couple. Dan has an income \$55,000 and Jon has an income of \$42,000.

- (a) (4 points) Suppose they file their taxes separately using the standard single deduction. Fill in the information below:

Dan will have a taxable income of \$\_\_\_\_\_ and will owe \$\_\_\_\_\_ in federal income taxes.

Jon will have a taxable income of \$\_\_\_\_\_ and will owe \$\_\_\_\_\_ in federal income taxes.

In total (as a family), they will owe \$\_\_\_\_\_ in federal income taxes.

<b>Filing status: Married filing jointly and surviving spouse</b>	
<b>Taxable Income (TI)</b>	<b>Taxes Owed</b>
\$0 - \$19,050	10% of taxable income
\$19,051 - \$77,400	\$1,905 plus 12% of TI over \$19,050
\$77,401 - \$165,000	\$8,907 plus 22% of TI over \$77,400
\$165,001 - \$315,000	\$28,179 plus 24% of TI over \$165,000
\$315,001 - \$400,000	\$64,179 plus 32% of TI over \$315,000
\$400,001 - 600,000	\$91,379 plus 35% of TI over \$400,000
\$600,001 +	\$161,379 plus 37% of TI over \$600,000

- (b) (3 points) Suppose instead they file their taxes jointly using the standard married deduction. Fill in the information below:

As a couple, they will have a taxable income of \$\_\_\_\_\_ and will owe \$\_\_\_\_\_ in federal income taxes.

- (c) (2 points) Dan suggests they should file their taxes separately. Jon says they should file jointly. Who is right?

- (d) (2 points) Suppose the government increases the top tax bracket from 37% to 39.6%. Will this affect how much the couple pay in federal income taxes?



Page	Points	Score
2	10	
3	13	
4	18	
5	14	
6	11	
7	8	
8	11	
9	8	
10	7	
Total:	100	