Discrete Mathematics 9.1 Worksheet: Percent, Sales Tax and Income Tax (20 points)

1) **Express the fraction as a percent.**

$\frac{5}{8}$ $\frac{7}{8}$ $\frac{5}{6}$ $\frac{7}{10}$

2) **Write the decimal as a percent.**

0.557 3.4 0.00583 29

3) **Express the percent as a decimal**

49.3% 670% $\frac{8}{11}\%$ 2%

4) What number is 16% of 39?

5) 23 is 2% of what number?

6) 60% of what number is 87?

7) 1.2 is 24% of what number?

8) 144 is what percent of 90?

9) 6 is what percent of 25?

10) Suppose that 7% of teachers at a university attended a conference. If 5000 teachers are enrolled at the university, about how many teachers attended the conference?

11) **Use the table to calculate the income tax owed.**

2005 MARGINAL TAX RATES, STANDARD DEDUCTIONS, AND EXEMPTIONS

	Unmarried, divorced, or legally separated	Married and each partner files a separate tax return	Married and both partners file a single tax return	Unmarried and paying more than half the cost of supporting a child or parent
Tax Rate	**Single**	**Married Filing Separately**	**Married Filing Jointly**	**Head of Household**
10%	up to $7300	up to $7300	up to $14,600	up to $10,450
15%	$7301 to $29,700	$7301 to $29,700	$14,601 to $59,400	$10,451 to $39,800
25%	$29,701 to $71,950	$29,701 to $59,975	$59,401 to $119,950	$39,801 to $102,800
28%	$71,951 to $150,150	$59,976 to $91,400	$119,951 to $182,800	$102,801 to $166,450
33%	$150,151 to $326,450	$91,401 to $163,225	$182,801 to $326,450	$166,451 to $326,450
35%	more than $326,450	more than $163,225	more than $326,450	more than $326,450
Standard Deduction	$5000	$5000	$10,000	$7300
Exemptions (per person)	$3200	$3200	$3200	$3200

Married couple filing jointly with two dependent children

Gross Income: $94,000

Adjustments: None

Deductions:

$12,000 mortgage interest

$5000 charitable contributions

$2500 student loan interest

Tax credit: $2000

Discrete Mathematics 9.2 Worksheet: Simple Interest (16 points)

1) A student took out a simple interest loan for $14,000 for five years at a rate of 7.5% to pay for college tuition. Find the interest of the loan.

2) Anna invested $5000 at a simple interest rate of 8.5% for 9 months. How much interest will she accrue?

3) A man borrowed $12,600 at a simple interest rate of 9% for 60 days. How much interest will he pay, if we assume that there are 360 days in a year? How much **more** money would he pay in interest if the loan was for 180 days?

4) A family made an investment for 7 years at a rate of 6.5%, and ending up earning $340 in interest. Find the value of the original investment.

5) Jason borrowed $1400 from his parents, and promised to pay his parents $600 in interest in 2 years. What simple interest rate, to the nearest tenth of a percent, will he pay?

6) A loan of $24,000 has been made at a simple interest rate of 6.5% for five years. Find the loan's future value (the full amount that must be paid back for the loan.)

7) An investment of $8,000 is made for 18 months at a simple interest rate of 3.9%. Find the investment's future value.

8) A doctor wants to start his own practice, and so he borrows $150,000 from his bank to pay for equipment and start-up costs. He ends up paying a total of $185,500 back to the bank at the end of the loan. If his simple interest rate was 6.5%, how long did it take him to pay back his loan (round to one decimal place)?

9) Treasury bills (T-bills) can be purchased from the US Treasury Department. You buy a T-bill for $981.60 that pays a total of $1000 in 13 weeks. What simple interest rate, to the nearest tenth of a percent, does this T-bill earn?

10) A family has $6000 that they would like to invest, and they have three options. Which investment earns the most interest? Also, what is that amount of interest, and what is the future value?

Option A: The length of the investment is 7 years, at an interest rate of 5.8%.
Option B: The length of the investment is 6 years, at an interest rate of 6.2%.
Option C: The length of the investment is 5 years, at an interest rate of 6.7%.

11) You borrow $12,000 on a 6.5% discounted loan for a period of 3 years.

a) What is the loan's discount?
b) Determine the net amount of money you receive.
c) What is the loan's actual simple interest rate, to the nearest tenth of a percent?

12) Marta borrows $3000 on an 8% discounted loan for a period of 9 months.

a) What is the loan's discount?
b) Determine the net amount of money you receive.
c) What is the loan's actual simple interest rate, to the nearest tenth of a percent?

9.3 Worksheet: Compound Interest (17 points)

1) $9000 is invested in an account that earns 5.5% interest, compounded quarterly.
   a) Find the total amount of money in the account after 4 years.
   b) Find the amount of interest earned.

2) Tara and Stephie each have $2000 to invest. Tara invests her money in an account that earns 6% interest, compounded monthly, for 3 years. Stephie invests her money in an account that earns 5.5% interest, compounded annually, for 4 years. Find the *difference* in the final amounts for each investment, and also specify whose investment grew to a larger amount.

3) A loan for $600 is compounded annually at a rate of 7.2%. If the length of the loan is 8 years, how much will it cost to pay back the loan? Round to one decimal place.

4) An investment of $25,000 is compounded daily at a rate of 5.5% for 20 years.
   a) How much money will the investment be worth after 20 years?
   b) Find the amount of interest earned.

5) Solve each equation for *t*. Round to 2 decimal places.
   a) $36.2 = 8^t$ b) $18 = 6(4)^t$

6) How many years would it take to have a total of $9,000, if $6000 is deposited into an account with an interest rate of 8.7%, compounded annually?

7) You deposit $2800 in a savings account that has a rate of 7%. The interest is compounded semi-annually.
   a) How much money will you have after three years?
   b) Find the interest after three years.

8) Find the number of years it would take for an initial investment of $2000 to grow to $12,000, if it is in an account earning 6% interest, compounded monthly. Write your answer to the nearest year.

9) You decide to invest $6000 for 10 years and you have a choice between two accounts. The first pays 7% per year, compounded monthly. The second pays 6.35% per year, compounded continuously. Which is the better investment? How much more is earned?

10) Beatriz invests $1400 in an account that earns 4% interest, compounded continuously. Find the total value of the investment after five years. Also, how much interest is earned?

11) Mitch invests $8000 in an account that earns 8% interest, compounded continuously. Around how many years would it take for this amount to grow to $30,000? Round your answer to one decimal place.

12) How much money should be deposited in an account today that earns 8.4% compounded daily so that it will accumulate to $6,000 in five years?

13) Bill would like to save $50,000 so that he can make a down payment on a house in ten years. How much money should invest now in an account that earns 6% compounded monthly?

9.4 Worksheet: Annuities, Stocks, and Bonds (27 points)

1) At age 25, in order to save for retirement, you decide to deposit $600 at the end of each year in an annuity that pays 5.5% compounded annually.
   a) Find the value of the annuity after 40 years.
   b) Find the interest earned over the 40 years.

2) Just like in #1, your friend starts saving for retirement and wants to put $600 each year into an annuity. But instead of making one deposit each year, your friend decides to deposit $50 each month. The annuity pays 5.5% compounded monthly.
   a) Find the value of the annuity after 40 years.
   b) Find the interest earned over the 40 years.
   c) Compare your friend's results with your results from #1. Whose annuity is worth more, and what is the difference in these amounts?

3) In order to offer scholarship funds to children of employees, a company invests $10,000 quarterly in an annuity that pays 10.5% compounded quarterly.
   a) How much will the company have in scholarship funds at the end of ten years?
   b) How much interest will be earned at the end of ten years?

4) Marla, Jody, Loni, Ardis, and Cheri each want to invest $5000 for four years to save for a trip to Europe.

For a – e: Find the amount that each person will have earned at the end of four years, using the information below.
   a) Marla makes a one-time investment of $5000 in a savings account with a 6% simple interest rate.
   b) Jody deposits $1250 at the end of each year for four years in an annuity earning 6% interest, compounded annually.
   c) Loni deposits $625 every six months for four years in an annuity earning 6% interest, compounded semi-annually.
   d) Ardis deposits $312.50 every three months for four years in an annuity earning 6% interest, compounded quarterly.
   e) Cheri deposits $104.17 at the end of every month for four years in an annuity earning 6% interest.
   f) Whose plan is worth the most? How much interest did that person accrue?

5) You would like to have $30,000 to use as a down payment for a home in six years by making regular, quarterly deposits in an annuity that pays 7.5% compounded quarterly.
   a) How much will you have to deposit every 3 months?
   b) How much of the $30,000 down payment comes from interest?

6) Pierce would like to have $12,000 in three years in order to pay for his daughter's college tuition. How much will he have to deposit for each payment in the situations described below?
   a) Monthly deposits are made in an annuity with 8% interest, compounded monthly.
   b) Quarterly deposits are made in an annuity with 9% interest, compounded quarterly.
   c) Which option would allow Pierce to invest the least amount of money per **year** and still meet his goal?

7) Kierra receives an inheritance of $40,000, and she decides to invest it. She considers the two options below. Find the value of each investment after 10 years.
   a) Deposit the full $40,000 in a savings account earning 6.5% interest, compounded quarterly, for 10 years.
   b) Deposit $1000 at the end of every three months in an annuity earning 8.5% interest, compounded quarterly.

For #8 – 14, consider the stock table below for both JC Penny and Goodyear Tires.

52-week High	Low	Stock	SYM	Div	Yld %	PE	Vol 100s	Hi	Lo	Close	Net Chg
73.25	45.44	Goodyear	GT	1.20	2.2	17	5915	56.38	54.38	55.50	+1.25
78.34	35.38	JC Penney	JCP	2.18	4.7	22	7473	48.19	48.19	46.63	-1.31

8) What was the high price for a share of JC Penney stock for the past 52-weeks?
9) If you owned 700 shares of Goodyear shock last year, what dividend did you receive?
10) How many shares of JC Penney stock were traded yesterday?
11) What was the price of a share of Goodyear stock at closing yesterday?
12) What was the low price for a share of Goodyear stock for the past 52-weeks?
13) What is the change in price for a share of JC Penney stock from market close two days ago to yesterday's market close?
14) Compute the annual earnings per share for Goodyear Tires using the formula below:

$$\text{Annual earnings per share} = \frac{\text{Yesterday's closing price per share}}{\text{PE ratio}}$$

9.5 Worksheet: Installment Buying (18 points)

1) The cost of an SUV is $27,000. Bryan finances this by paying $5000 down and then $410 per month for 60 months.
   a) Determine the amount financed.
   b) Determine the total installment price.
   c) Find the finance charge.

2) Laura purchases a computer that costs $2450, and she pays $550 down. After that, she will pay $94.50 per month for 24 months.
   a) Determine the amount financed.
   b) Determine the total installment price.
   c) Find the finance charge.

3) Garrett buys a new washer-dryer for $1100. He pays $100 down and $110 per month for 12 months.
   a) Determine the amount financed.
   b) Determine the total installment price.
   c) Find the finance charge.

4) The cost of a used car is $5675. This is financed by paying $1223 down and $125 per month for 48 months.
   a) Determine the amount financed.
   b) Determine the total installment price.
   c) Find the finance charge.

Use the table shown for #5 – 9.

TABLE 8.3 ANNUAL PERCENTAGE RATE (APR) FOR MONTHLY PAYMENT LOANS

Number of Monthly Payments	Annual Percentage Rate (APR)												
	10.0%	10.5%	11.0%	11.5%	12.0%	12.5%	13.0%	13.5%	14.0%	14.5%	15.0%	15.5%	16.0%
	(Finance charge per $100 of amount financed)												
6	$2.94	$3.08	$3.23	$3.38	$3.53	$3.68	$3.83	$3.97	$4.12	$4.27	$4.42	$4.57	$4.72
12	5.50	5.78	6.06	6.34	6.62	6.90	7.18	7.46	7.74	8.03	8.31	8.59	8.88
18	8.10	8.52	8.93	9.35	9.77	10.19	10.61	11.03	11.45	11.87	12.29	12.72	13.14
24	10.75	11.30	11.86	12.42	12.98	13.54	14.10	14.66	15.23	15.80	16.37	16.94	17.51
30	13.43	14.13	14.83	15.54	16.24	16.95	17.66	18.38	19.10	19.81	20.54	21.26	21.99
36	16.16	17.01	17.86	18.71	19.57	20.43	21.30	22.17	23.04	23.92	24.80	25.68	26.57
48	21.74	22.90	24.06	25.23	26.40	27.58	28.77	29.97	31.17	32.37	33.59	34.81	36.03
60	27.48	28.96	30.45	31.96	33.47	34.99	36.52	38.06	39.61	41.17	42.74	44.32	45.91

5) You plan to pay for a new couch in 18 equal monthly payments. The finance charge per $100 financed is $12.72. Find the APR for this loan.

6) The finance charge per $100 financed for a refridgerator that is paid off in 12 monthly payments is $7.74. Find the APR for this loan.

7) A used car is financed for $4450 over 48 months. The total finance charge is $1279.
   a) Find the finance charge per $100 financed.
   b) Find the APR for this loan.

8) The sale price for furniture for all rooms of a 3-bedroom house is $17,500. The furniture can be financed by paying $500 down and $380.55 per month for 60 months.
   a) Determine the amount financed.
   b) Find the total installment price.
   c) Determine the finance charge.
   d) Find the finance charge per $100 financed.
   e) Find the APR for this loan.

9) The cost of a car is $18,000, which can be financed by paying $600 down and $385 per month for 60 months. Find the APR for this loan. (Hint: look at the steps for #8 for guidance.)

9.5 Worksheet continued: Credit Cards (18 points)

For #10 – 17: Tracy gets a new credit card that uses the unpaid balance method, with an annual percentage rate of 15%. The table below shows the purchases she made during the month of September, with a starting balance of $2000 dollars. Her minimum payment is $10 if her balance is less than $200, or $\frac{1}{36}$ of her unpaid balance if it is $200 or greater. Her account activity for September is below.

Date	Description	Amount
9/3	Grocery bill	$45.00
9/6	Gas station	$60.00
9/15	Payment	$50.00
9/26	Movie Tickets	$22.00

10) What is her simple interest rate for each month?
11) Find her unpaid balance for September.
12) Find the amount of interest due in September.
13) What is the total balance on the credit card for September?
14) What is the minimum payment for September, rounded to the nearest dollar?

Tracy pays the minimum amount for her September bill on October 15th. She makes the purchases listed below in the table.

15) Find her total balance at the end of October
16) Find the minimum payment for October.

Date	Description	Amount
10/13	Gas station	$57.00
10/15	Minimum Payment	_____
10/17	Restaurant	$39.00
10/22	Grocery store	$70.00
10/29	Gas station	$51.00

17) Tracy makes the minimum payments for November, December, and January. She does not make any new purchases. Find her ending balance for each of these months. Be sure to include any new interest accrued and payment made. Worth 3 points.

18) Ethan's credit card uses the previous balance method, with 1.3% interest for each month. In January, Ethan has a previous balance of $1200. He pays $120 per month. Find his ending balance for each month from January until June. Worth 6 points.

Discrete Math 9.6 Worksheet: The Cost of Home Ownership (20 points)

For #1 – 5: The price of a home is $290,000. The bank requires a 20% down payment and three points at the time of closing. The cost of the home is financed with a 30-year fixed mortgage at 7%.

1) Find the required down payment.
2) Find the amount of the mortgage.
3) How much must be paid for the three points at closing?
4) Find the monthly payment (excluding escrowed taxes and insurance.) Round to 2 decimal places.
5) Find the total amount of interest paid over 30 years.

For #6 – 11: The price of a condominium is $180,000. The bank requires a 5% down payment, and this is financed with a 30-year fixed mortgage at 8%.

6) Find the required down payment.
7) Find the amount of the mortgage.
8) Find the monthly payment (excluding escrowed taxes and insurance.) Round to 2 decimal places.
9) Find the total amount of interest paid over 30 years.

For #10 – 12: The price of a small home is $160,000 with a 15% down payment. The buyer is offered two mortgage options: 15-year fixed at 8% or 30-year fixed at 7%.

10) Calculate the monthly payment for the 15-year mortgage. Round to 2 decimal places.
11) Calculate the monthly payment for the 30-year mortgage. Round to 2 decimal places.
12) Find the amount of **interest** saved with the 15-year mortgage compared to the 30-year mortgage.

13) Which of the following mortgages would require less paid in interest (and how much less) for a $150,000 mortgage? Option A: 30-year fixed mortgage at 8% or Option B: 20-year fixed mortgage at 7.5%

For #14 – 16: You borrow $30,000 for four years at 8% interest so that you can buy a new car.

14) Find the monthly payment. Round to 2 decimal places.
15) How much interest will you pay over the life of the loan?
16) Your friend also borrows $30,000 for a new car, but his loan is for 3 years at 9% interest. Who will pay more interest over the life of the loan, and how much more?

For #17 – 20: Angelica graduates from college with a loan of $40,000. The interest rate is 8.5%, and the loan is for 20 years.

17) Find the monthly payment. Round to 2 decimal places.
18) How much interest will Angelica pay over the life of the loan?
19) Angelica's twin brother, Jose, also graduates from college with a loan of $40,000 at an interest rate of 8.5%, but the length of his loan is 10 years. Find Jose's monthly payment. Round to 2 decimal places.
20) How much less interest with Jose pay over the life of his loan than Angelica?