Name: _____

Soc sec #: _____

Work quickly and carefully, following directions closely.

§ I.   TRUE AND / OR FALSE. Circle your answer. There are 2 questions at 2 points each.

1.   TRUE or FALSE: The *effective interest rate* is the annual rate divided by 12 months.

2.   TRUE or FALSE: The exponential function e^x is its own derivative.

§II. MULTIPLE CHOICE. Circle your answer. There are 3 question at 5 points each.

1.   The derivative of the function $y = e^{\left(2x^3\right)}$ is

(a) $y = e^{\left(6x^2\right)}$ (b) $y = 6x^2 e^{\left(2x^3\right)}$ (c) $y = 2x^3 e^{\left(2x^3 - 1\right)}$

(d) none of the above   (e) all of the above

2.   A maximum of the function $S(t): = \dfrac{2t^2 e^{\left(-t^2\right)}}{3!}$ is at

(a) $t = 0$ (b) $t = 1$ (c) both   (d) neither

3.   The <u>present value</u> of $1,000 invested at 10% compounded quarterly for 7 years is

(a) $1,000   (b) $1,996.50 (c) both   (d) neither

§ III.   PROBLEMS. You **must** show your work to receive credit. There are 5 problems at 10 points each.

1. Consider the cash flow at the right. What is the <u>present value</u> of the total at the end of the fifth year if the interest is 5% compounded annually.

	A	B	C	D	E
1	Year	1	2	3	4
2	Deposit	1200	1300	1150	1450
3					

1996 North Carolina Tax Rate Schedule: NC Tax Income (NCTI) is $50,000 or more.

| Filing Status	NC Taxable income is more than	NC Taxable income is not over	The Tax is
	$ 0	$ 12,750	6% of NCTI
Single	$ 12,750	$ 60,000	$765 + 7% of NCTI over $12,750
	$ 60,000	---------	$4072.50 + 7.75% of NCTI over $60,000

2. a. Use the **last four digits** of your soc. sec. number **times** 1000 to be your annual NC taxable income (your NCTI). Use the tax table above to calculate your NC State Income Tax.

   NCTI _____ ,   Tax _____

   b. Is the NC tax function is discontinuous ? If so, where are the discontinuities and what kind are they ?

EC: Who wrote the poem "Whales Weep Not!" ? _____

3. Graph the function $y = \dfrac{x^2 - 4}{x + 2}$. Label any discontinuities and give their type.
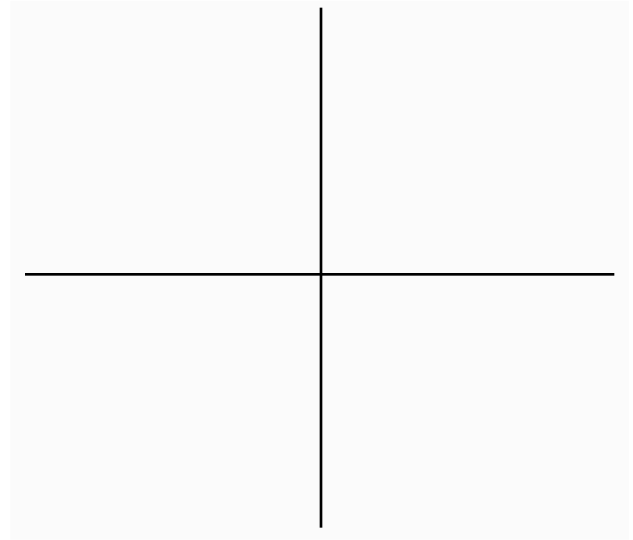
4. Jean-Luc propitiously decides to save for retirement. On his 30th birthday he begins to deposit $100 per month at 6.5%. A stroke of ill fortune causes Jean-Luc to stop making deposits on his 40th birthday, but his luck isn't all bad, and the interest rates to climb to 7.25%. On his 65th birthday how much money is in Jean-Luc's account if he made no withdrawals before then?

5. a. What are the payments for a 30 year $150,000 mortgage at $7^3/_4$ % ?

   b. Determine how many months early the mortgage will be paid off if the mortgagee pays $75 extra each month.

EC: Who wrote the poem "Whales Weep Not!" ? _____