Each problem is worth 8 points, except #9.

(1) In Canada gasoline costs 74.9 Canadian cents per liter. The money exchange rate is $1.2374 Canadian dollars = 1 U. S. dollar.

The metric conversion is 

\[ 1 \text{ liter} = 0.26417 \text{ gallons} \]

What is the price in U.S. currency for one gallon of gasoline in Canada?

\[ \text{Solution:} \]

\[ \frac{0.749 \text{ Canadian dollars}}{\text{liter}} \times \frac{1 \text{ U.S. dollar}}{1.2374 \text{ Canadian dollars}} \times \frac{1 \text{ liter}}{0.26417 \text{ gallons}} = 2.29 \text{ dollars/gallon} \]

(2) What buttons do you push on your calculator to compute 

\[ \frac{1 + 2^{10}}{9.1 - 5.5} \]?

\[ \text{Solution:} \quad (1 + 2^{10}) / (9.1 - 5.5) \]

You may write \( x^y \) for \(^\) and \( \div \) for \(/\).

(3) You and your friends go out to eat in a fancy restaurant. Since there are five people in your party, the restaurant policy is to add a 17% tip to your bill. If your final bill is $150.38, including the tip, how much was the bill before the tip was added on

\[ \text{Solution:} \]

\[ \frac{150.38}{1.17} = 128.53 \]
(4) Bob’s VISA card has a 19.8% APR, compounded monthly. What is the Annual Percentage Yield (APY) of this credit card agreement?

*Solution:*

\[
(1 + \frac{.198}{12})^{12} = 1.217
\]

so the APY = 21.7%.

---

(5) How much will you pay for a $100 U.S. Savings Bond, which matures in 5 years, at an interest rate of 4 percent, compounded annually?

*Solution:*

\[
\frac{100}{1.04^5} = 82.19
\]

(6) A company advertises “Loans Before Payday.” Your weekly paycheck is $260. They will advance you the 260 dollars a week before payday for a $25 fee. How much annual interest are they charging you? (There are 52 weeks in a year.)

*Solution:*

weekly interest = annual interest/52

so

annual interest = 52 \times \text{weekly interest} = 52 \times \frac{25}{260} = 5.00

The annual interest is 500 percent.
(7) On May 4, 1626, Native Americans living in New York sold the island of Manhattan to the Dutch for $24 in cloth and buttons. If the Native Americans had invested this money in a savings account at 6 percent interest, compounded annually, what would it be worth on May 4, 2005?

Solution:

\[(1.06)^{379} \times 24 = 93,569,471,620\]

(8) Discuss the national debt? Where did it come from? Is it likely to be paid off in your lifetime?

Solution:

The national debt represents the amount of money that has accumulated over the years by adding up the difference between the money the U.S. government spends and the money it takes in as tax revenue. This amount is nearly 8 trillion dollars. It will **never** be paid off in any of our lifetimes.

(9) [12 pts] You buy a $12000 car. You pay $2000 down and finance the balance at an annual interest rate of 7.25% in equal monthly payments over the next three years.

(a) What will your monthly payment be?

Solution:

\[M = \frac{(1 + .0725/12)^{36} \times .0725/12}{(1 + .0725/12)^{36} - 1} \times 10,000 = 309.92\]

(b) How much total interest will you pay over the three years?

Solution:

Total Interest = 36 \times 309.92 - 10,000 = 1,157.12
(10) Pauline’s grandparents want to contribute to her college education by accumulating $80,000 for her use when she turns eighteen. They have fifteen years to raise the money and estimate an expected interest of 6.82% compounded monthly. How much should they save each month to obtain the desired amount?

Solution:

\[
M = \frac{.0682/12}{(1 + .0682/12)^{180} - 1} \times 80,000 = 256.37
\]

(11) Calculate the cost of an annuity that pays $750 per month for 20 years at 7.5% interest.

Solution:

\[
M = \frac{(1 + .075/12)^{240} - 1}{(1 + .075/12)^{240} \times .075/12} \times 750 = 93,099.10
\]

(12) Discuss the advantages and disadvantages of a 30 year loan versus a 15 year loan for purchasing a house?

Solution:

The main advantage of a 30 year mortgage is that it is more affordable than a 15 year mortgage. Its main disadvantage is that the total interest payments are much higher.