1. **(6 points)** *You are hoping to save up $100,000 by judicious, periodic investments into an interest-bearing account over the next 20 years. You intend to make two contributions per year into an account that bears 2.4% annual interest compounding semiannually. How large does your periodic semiannual contribution need to be in order to achieve your goal?*

   Here you are building up an investment, so you want to use a formula for periodic contributions towards future accumulation, not a forumula for periodic payments on a loan. The desired formula will thus be $A = \frac{Fi}{(1+i)^m - 1}$, and in this case $F = \$100{,}000$, $r = 0.024$, and $t = 20$. Since interest and contribution are both semiannual, $n = 2$ and thus $i = \frac{0.024}{2} = 0.012$ and $m = 20 \times 2 = 40$, leading to the calculation $A = \frac{\$100{,}000 \times 0.012}{1.012^{40} - 1} = \boxed{\$1962.50.}$ If you wish to sanity-check your result, consider that 40 contributions of $1962.50 is a total contribution of $78,500, which is less than your goal of $100,000 but within a plausible distance for the interest payments to be making up the shortfall.

2. **(5 points)** *You have borrowed $3000 at an annual interest rate of 4.5% compounding annually, to be repaid with four equal payments of $836.23 over the next four years. Complete the following amortization schedule, rounding each quantity to the nearest cent.*

Year	Starting balance	Payment	Interest	Principal repaid	Ending balance
1	$3,000.00	$836.23	$135.00	$701.23	$2,298.77
2	$2,298.77	$836.23	$103.44	$732.79	$1,565.98
3	$1,565.98	$836.23	$70.47	$765.76	$800.22
4	$800.22	$836.23	$36.01	$800.22	$0.00

3. **(4 points)** *A house costs $165,000 and you are putting 15% down to buy it and taking out a 30-year mortgage at an annual rate of 2.875% with 1.5 points on the loan. Determine, labeling which is which, the size of your down payment and the initial size of the loan.*

   The down payment of 15% is $165{,}000 \times 0.15 = \boxed{\$24{,}750.}$ The remainder to be borrowed is $165,000 − $24,750 = $140,250. To get 1.5 points on this loan, we want a loan of which 1.5% is points and of which the remaining 88.5% is the house-buying loan; that is to say, we want some loan value, 98.5% of which is $140,250. Thus our total loan will be $\frac{\$140{,}250}{0.985} = \boxed{\$142{,}385.79.}$

4. **(5 points)** *You have a $600 debt on a credit card with a 24% annual interest rate compounting monthly. If you make a payment of $30 towards your credit card debt each month (and make no more purchases with the card), how many months will it take you to pay off the debt?*

   The *monthly* interest rate is $i = \frac{24\%}{12} = 0.02$, the loan principal $P = \$600$, and the monthly payment is $A = 30$, so the number of months to discharge the debt is

   $$m = \frac{-\log\left(1 - \frac{Pi}{A}\right)}{\log(1+i)} = \frac{-\log\left(1 - \frac{600 \times 0.02}{30}\right)}{\log(1.02)} \approx 25.79$$

   which rounds up to $\boxed{26}$ months.