

## Formula sheet for test 4

Calculating Income Tax:

1. Gross income = Wages + interest earned on savings account.
2. Determine your adjusted gross income:  
Adjusted gross income = Gross Income – Adjustment
3. Determine your taxable income:  
Taxable income = Adjusted gross income – (Exemptions + Deductions)

Exemptions: fix amount by IRS      Deductions: Standard deduction or Itemized deduction.

**Compound interest** is interest computed on the original principal as well as on any accumulated interest. To calculate the compound interest paid once a year we use  $A = P(1 + r)^t$ , where  $A$  is called the account's **future value**, the principal  $P$  is called its **present value**,  $r$  is the rate (percentage/100);  $n$  is the number of times the interest is compounded ( $n=1$  for annually;  $n=2$ , semiannually;  $n=4$  for quarterly;  $n=12$  for monthly) and  $t$  is the number of years. To calculate the compound interest paid more than once a year we use

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

### Annuities

An *annuity* is a sequence of equal payments made at equal time periods. The *value of an annuity* is the sum of all deposits plus all interest paid.

If  $P$  is the deposit made at the end of each year for an annuity that pays an annual interest rate  $r$  (in decimal form) compounded once a year, the value,  $A$ , of the annuity after  $t$  years is

$$A = \frac{P \left[ (1 + r)^t - 1 \right]}{r}$$

If  $P$  is the deposit made at the end of each compounding period for an annuity that pays an annual interest rate  $r$  (in decimal form) compounded  $n$  times per year, the value,  $A$ , of the annuity after  $t$  years is

$$A = \frac{P \left[ \left( 1 + \frac{r}{n} \right)^{nt} - 1 \right]}{\frac{r}{n}}$$

which is equivalent to

$$A = P \left[ \left( 1 + \frac{r}{n} \right)^{nt} - 1 \right] \times \frac{n}{r}$$

### Mortgages

The regular payment amount,  $PMT$ , required to repay a loan of  $P$  dollars paid  $n$  times per year over  $t$  years at an annual rate  $r$  is given by

$$PMT = \frac{P \left( \frac{r}{n} \right)}{\left[ 1 - \left( 1 + \frac{r}{n} \right)^{-nt} \right]}$$

For mortgages payments  $n=12$  (always).