Math 230 Formula Sheet
Interest and annuities

Basic Interest Formulas:

P is the principal or present value
A is the future or maturity value
r is the annual (stated or nominal) interest rate
t is the number of years
m is the number of compounding periods per year
i is the interest rate per period ($i = r/m$)
n is the total number of compounding periods ($n = tm$)
r_E is the effective rate

ID	Simple Interest	ID	Compound Interest	ID	Continuous Compounding
1	$A = P(1+rt)$	3	$A = P(1+i)^n$	6	$A = Pe^{rt}$
2	$P = \dfrac{A}{1+rt}$	4	$P = \dfrac{A}{(1+i)^n} = A(1+i)^{-n}$	7	$P = Ae^{-rt}$
		5	$r_E = \left(1+\dfrac{r}{m}\right)^m - 1$	8	$r_E = e^r - 1$

Geometric Sequences and Series

a is the first term
r is the common ratio (cannot equal 1)
n is the number of terms in the sequence
S_n is the sum of the first n term

n th term: ar^{n-1}

Sum of the first *n* terms: $S_n = \dfrac{a(r^n - 1)}{r - 1}$ $(r > 1)$

Sum of the first *n* terms: $S_n = \dfrac{a(1 - r^n)}{1 - r}$ $(0 < r < 1)$

Sum of <u>all</u> the terms ($n \to \infty$): $S = \dfrac{a}{1-r}$ $(0 < r < 1)$

Future Value of an Ordinary Annuity

S is the future value

R is the periodic payment

i is the interest rate per period

n is the total number of periods

ID	Future value	ID	Payment amount
10	$S = R\left[\dfrac{(1+i)^n - 1}{i}\right]$	11	$R = \dfrac{Si}{(1+i)^n - 1}$

Present Value of an Ordinary Annuity

P is the present value (or loan amount)

R is the periodic payment (made at the <u>end</u> of each period)

i is the interest rate per period

n is the total number of periods

ID	Present value	ID	Payment to amortize
20	$P = R\left[\dfrac{1 - (1+i)^{-n}}{i}\right]$	21	$R = \dfrac{Pi}{1 - (1+i)^{-n}}$