Imperial College London

NOTES

IMPERIAL COLLEGE LONDON

DEPARTMENT OF COMPUTING

422 Computational Finance

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1 Useful Identities

Geometric Progression

$$S_n = \sum_{k=1}^{n} ar^{k-1} = \frac{a(1-r^n)}{1-r}$$
$$S_\infty = \sum_{k=0}^{\infty} ar^{k-1} = \frac{1}{1-r}$$

Arithmetic - Geometric Progression

$$S_n = \sum_{k=1}^{n} [a+(k-1)d]\, r^{k-1} = \frac{a-[a+(n-1)d]\, r^n}{1-r} + \frac{dr(1-r^{n-1})}{(1-r)^2}$$

Price of an Annuity

$$a_{\overline{n}|} = \frac{1-v^n}{i}$$
$$a_{\overline{n}|}^{(m)} = \frac{1-v^n}{r^m}$$

Price of a Perpetuity

$$a_{\overline{\infty}|} = \frac{1}{i}$$
$$a_{\overline{\infty}|} = \frac{1}{r^m}$$

Price of a varying annuity

$$(Ia)_{\overline{n}|} = Pa_{\overline{n}|} + D\left[\frac{a_{\overline{n}|} - nv^n}{i}\right]$$

Price of a bond

$$P = NCa_{\overline{n}|} + Nv^n$$