Present value of	This many years in future	Discount rate			
$1	n	r	$1 / (1 + r)^n$		
$1	1	5%	$1 / (1.05)^1$	1 / 1.05	.952
$1	2	5%	$1 / (1.05)^2$	1 / 1.103	.907
$1	3	5%	$1 / (1.05)^3$	1 / 1.158	.864
$1	4	5%	$1 / (1.05)^4$	1 / 1.216	.823
$1	5	5%	$1 / (1.05)^5$	1 / 1.276	.784
$1	6	5%	$1 / (1.05)^6$	1 / 1.340	.746
$1	7	5%	$1 / (1.05)^7$	1 / 1.407	.711
$1	8	5%	$1 / (1.05)^8$	1 / 1.477	.677
$1	9	5%	$1 / (1.05)^9$	1 / 1.551	.645
$1	10	5%	$1 / (1.05)^{10}$	1 / 1.629	.614
$1	11	5%	$1 / (1.05)^{11}$	1 / 1.710	.585
$1	12	5%	$1 / (1.05)^{12}$	1 / 1.796	.557
$1	13	5%	$1 / (1.05)^{13}$	1 / 1.886	.530
$1	14	5%	$1 / (1.05)^{14}$	1 / 1.980	.505
$1	15	5%	$1 / (1.05)^{15}$	1 / 2.079	.481
$1	16	5%	$1 / (1.05)^{16}$	1 / 2.183	.458
$1	17	5%	$1 / (1.05)^{17}$	1 / 2.292	.436
$1	18	5%	$1 / (1.05)^{18}$	1 / 2.407	.416
$1	19	5%	$1 / (1.05)^{19}$	1 / 2.527	.396
$1	20	5%	$1 / (1.05)^{20}$	1 / 2.653	.377
Total, 20 years					$12.462

Present value of $1 a year forever, at 5% = 1 / r = $20

Discount rate of .05 = Multiplier of 20

Present value of	This many years in future	Discount rate			
$1	n	r	$1 / (1 + r)^n$		
$1	1	8%	$1/ (1.08)^1$	1 / 1.08	.926
$1	2	8%	$1/ (1.08)^2$	1 / 1.166	.857
$1	3	8%	$1/ (1.08)^3$	1 / 1.260	.794
$1	4	8%	$1/ (1.08)^4$	1 / 1.360	.735
$1	5	8%	$1/ (1.08)^5$	1 / 1.469	.681
$1	6	8%	$1/ (1.08)^6$	1 / 1.587	.630
$1	7	8%	$1/ (1.08)^7$	1 / 1.714	.583
$1	8	8%	$1/ (1.08)^8$	1 / 1.851	.540
$1	9	8%	$1/ (1.08)^9$	1 / 1.999	.500
$1	10	8%	$1/ (1.08)^{10}$	1 / 2.159	.463
$1	11	8%	$1/ (1.08)^{11}$	1 / 2.332	.429
$1	12	8%	$1/ (1.08)^{12}$	1 / 2.518	.397
$1	13	8%	$1/ (1.08)^{13}$	1 / 2.720	.368
$1	14	8%	$1/ (1.08)^{14}$	1 / 2.937	.340
$1	15	8%	$1/ (1.08)^{15}$	1 / 3.172	.315
$1	16	8%	$1/ (1.08)^{16}$	1 / 3.426	.292
$1	17	8%	$1/ (1.08)^{17}$	1 / 3.700	.270
$1	18	8%	$1/ (1.08)^{18}$	1 / 3.996	.250
$1	19	8%	$1/ (1.08)^{19}$	1 / 4.316	.232
$1	20	8%	$1/ (1.08)^{20}$	1 / 4.661	.215
Total, 20 years					$9.818

Present value of $1 a year forever, at 8% = 1 / r = $12.50

Discount rate of .08 = Multiplier of 12.5

Present Value Puzzles

You can do these either by applying the formulas, or by consulting the tables in the back of the Chirelstein income tax handbook (or similar tables on line, of course). Better yet, find a computer program that will perform the calculations, and learn how to use it.

The formula for the present value of a single receipt of $1 at a specified time in the future:

$$\$1 \, / \, (1 + r)^n$$

where r is the annual discount rate (expressed as a decimal fraction) and n is the number of years' delay until the receipt of the dollar.

The formula for the present value of the right to receive $1 a year indefinitely:

$$\$1 \, / \, r$$

Here are some problems. Give them a try:

1. An asset is expected to generate $1,000 of profit at the end of each year for the next four years, at the end of which time it will be worthless. Assume a discount rate of 4 percent per annum.

2. Same as problem 1, but at the end of the fourth year, in addition to the $1,000 annual receipt, the owner expects to be able to sell the used asset for a salvage value of $500.

3. Company X is expected to generate earnings (i.e., profit) of $2 a share each year, indefinitely. What is the value of a share of X stock? Assume a discount rate of 12 percent per annum.

4. The stock of Company Y is currently trading at a price of $5 a share. The most recent 12-month earnings of the company is $1.25 per share. What is the price-earnings ratio of the Y stock? What discount rate is the market using in valuing that stock?