

HP – 10B HELP SHEET - TVM Factors
TERRY COLLEGE OF BUSINESS- REAL ESTATE PROGRAM

Please report any errors in these examples to hmunneke@cba.uga.edu

FUTURE VALUE OF A LUMP SUM

What is the value of one hundred dollars in five years if it is invested today at an annual yield of 10%?

PV = 100 n = 5 m = 1 i = 10 FV = ?	$FV = PV \left[FVF_{i/m, nm} \right]$ $= 100 \left[FVF_{0.10/1, 5} \right]$ $= 100 \left[(1 + 0.10)^5 \right]$	<p>Future Value Factor</p> $\left[FVF_{i/m, nm} \right] = \left[\left(1 + \frac{i}{m} \right)^{nm} \right]$
--	---	---

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of <i>P/YR</i> .
Set the payment per year (if necessary)	1 [SHIFT][P/YR]	1.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of <i>P/YR</i> .
Enter present value	100 [PV]	100	
Enter interest rate	10 [I/YR]	10.00	
Enter total number of payments	5 [N] or 5 [SHIFT][xP/YR][N]	5.00	
Compute future value	[FV]	-161.0510	

PRESENT VALUE OF A LUMP SUM

What is the value today of one hundred dollars in five years at an annual yield of 10%?

FV = 100 n = 5 m = 1 i = 10 PV = ?	$PV = FV \left[PVF_{i/m, nm} \right]$ $= 100 \left[PVF_{0.10/1, 5} \right]$ $= 100 \left[\frac{1}{(1 + 0.10)^5} \right]$	<p>Present Value Factor</p> $\left[PVF_{i/m, nm} \right] = \frac{1}{\left(1 + \frac{i}{m} \right)^{nm}}$
--	---	---

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of <i>P/YR</i> .
Set the payment per year (if necessary)	1 [SHIFT][P/YR]	1.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of <i>P/YR</i> .
Enter future value	100 [FV]	100	
Enter interest rate	10 [I/YR]	10.00	
Enter total number of payments	5 [N] or 5 [SHIFT][xP/YR][N]	5.00	
Compute present value	[PV]	-62.09213	

PRESENT VALUE OF AN ANNUITY

What is the value today of a five year one hundred dollars annual ordinary annuity discounted at an annual yield of 10%?

<p>ANN = 100 n = 5 m = 1 i = 10 PV = ?</p>	$PV = ANN \left[PVAF_{i/m, nm} \right]$ $= 100 \left[PVAF_{0.10/1, 5} \right]$ $= 100 \left[\frac{1 - \frac{1}{(1 + 0.10/1)^5}}{0.10/1} \right]$	<p style="text-align: center;">Present Annuity Value Factor</p> $\left[PVAF_{i/m, nm} \right] = \left[\frac{1 - \frac{1}{(1 + i/m)^{nm}}}{i/m} \right]$
--	---	--

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of <i>P/YR</i> .
Set the payment per year (if necessary)	1 [SHIFT][P/YR]	1.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of <i>P/YR</i> .
Enter annuity cash flow	100 [PMT]	100	
Enter interest rate	10 [I/YR]	10.00	
Enter total number of payments	5 [N] or 5 [SHIFT][xP/YR][N]	5.00	
Compute present value	[PV]	-379.07868	

FUTURE VALUE OF AN ANNUITY

What is the value of a five year one hundred dollar annual ordinary annuity at the end of the fifth year with an annual yield of 10%?

<p>ANN = 100 n = 5 m = 1 i = 10 FV = ?</p>	$FV = ANN \left[FVAF_{i/m, nm} \right]$ $= 100 \left[FVAF_{0.10/1, 5} \right]$ $= 100 \left[\frac{(1 + 0.10/1)^5 - 1}{0.10/1} \right]$	<p style="text-align: center;">Future Annuity Value Factor</p> $\left[FVAF_{i/m, nm} \right] = \left[\frac{(1 + i/m)^{nm} - 1}{i/m} \right]$
--	---	---

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of <i>P/YR</i> .
Set the payment per year (if necessary)	1 [SHIFT][P/YR]	1.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of <i>P/YR</i> .
Enter annuity cash flow	100 [PMT]	100	
Enter interest rate	10 [I/YR]	10.00	
Enter total number of payments	5 [N] or 5 [SHIFT][xP/YR][N]	5.00	
Compute future value	[FV]	-610.51000	

MORTGAGE CONSTANT

If I borrow \$100 at a 10% interest rate for 5 years with annual payments, what is the magnitude of the annual payment?

$ANN = PV \left[MC_{i/m, nm} \right]$ $= 100 \left[MC_{0.10/1, 5} \right]$ $= 100 \left[\frac{0.10/1}{1 - \frac{1}{(1 + 0.10/1)^5}} \right]$ <p style="font-size: small; margin-top: 10px;"> PV = 100 N = 5 M = 1 i = 10 ANN = ? </p>	<p>Mortgage Constant</p> $\left[MC_{i/m, nm} \right] = \left[\frac{i/m}{1 - \frac{1}{(1 + i/m)^{nm}}} \right]$
--	---

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of P/YR.
Set the payment per year (if necessary)	1 [SHIFT][P/YR]	1.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of P/YR.
Enter present value	100 [PV]	100	
Enter interest rate	10 [I/YR]	10.00	
Enter total number of payments	5 [N] or 5 [SHIFT][xP/YR][N]	5.00	
Compute annuity cash flow	[PMT]	-26.37975	

SINKING FUND FACTOR

How much will I need to deposit each year in my bank account, which provides me with a 10% yield, to accumulate \$100 at the end of 5 years.

$ANN = FV \left[SFF_{i/m, nm} \right]$ $= 100 \left[SFF_{0.10/1, 5} \right]$ $= 100 \left[\frac{0.10/1}{(1 + 0.10/1)^5 - 1} \right]$ <p style="font-size: small; margin-top: 10px;"> FV = 100 n = 5 m = 1 i = 10 ANN = ? </p>	<p>Sinking Fund Factor</p> $\left[SFF_{i/m, nm} \right] = \left[\frac{i/m}{(1 + i/m)^{nm} - 1} \right]$
--	--

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of P/YR.
Set the payment per year (if necessary)	1 [SHIFT][P/YR]	1.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of P/YR.
Enter future value	100 [FV]	100	
Enter interest rate	10 [I/YR]	10.00	
Enter total number of payments	5 [N] or 5 [SHIFT][xP/YR][N]	5.00	
Compute annuity cash flow	[PMT]	-16.37975	

MORTGAGE CONSTANT

Suppose a borrower wants to take out a \$100,000 mortgage loan. The lender wants to earn a 12 percent interest rate and to be repaid in equal monthly payments over 20 years. What is the monthly payment?

$ANN = PV \left[MC_{i/m, nm} \right]$ $= 100,000 \left[MC_{0.12/12, 240} \right]$ $= 100,000 \left[\frac{0.12/12}{1 - \frac{1}{(1 + 0.12/12)^{240}}} \right]$ <p style="margin-top: 10px;"> PV = 100,000 N = 20 m = 12 i = 12 ANN = ? </p>	<p>Mortgage Constant</p> $\left[MC_{i/m, nm} \right] = \left[\frac{i/m}{1 - \frac{1}{(1 + i/m)^{nm}}} \right]$
---	---

Procedure	Keystrokes	Display	
Clear TVM	[SHIFT – the orange key] [CLEAR ALL]	0.00	This sets <i>N</i> , <i>I/YR</i> , <i>PV</i> , <i>PMT</i> , and <i>FV</i> to zero and briefly displays the current value of <i>P/YR</i> .
Set the payment per year (if necessary)	12 [SHIFT][P/YR]	12.00	Note that holding [CLEAR ALL] after pressing [SHIFT] briefly displays the current value of <i>P/YR</i> .
Enter present value	100,000 [PV]	100,000	
Enter interest rate	12 [I/YR]	12.00	
Enter total number of payments	240 [N] or 20 [SHIFT][xP/YR][N]	240.00	
Compute annuity cash flow	[PMT]	-1101.08613	