
M. Short-Cut Calculation for Duration

The duration formulas can be programmed into some calculators to provide a speedy and efficient way for individuals to calculate duration. Of the calculators featured in this book only the HP 12C and HP 17BII have the capability of providing this shortcut. Their respective programs are as follows:

HP 12C Duration Formula

- | | |
|---|----------------|
| 1. f, P/R | 19. RCL 2 |
| 2. 1 | 20. × (TIMES) |
| 3. ENTER | 21. RCL 3 |
| 4. RCL 3 | 22. + (PLUS) |
| 5. + (PLUS) | 23. 1 |
| 6. ENTER | 24. + (PLUS) |
| 7. RCL 2 | 25. RCL 4 |
| 8. Y ^x (Y Raised to the x power) | 26. ÷ (DIVIDE) |
| 9. 1 | 27. STO 4 |
| 10. – (MINUS) | 28. RCL 3 |
| 11. RCL 1 | 29. 1 |
| 12. × (TIMES) | 30. + (PLUS) |
| 13. RCL 3 | 31. RCL 3 |
| 14. + (PLUS) | 32. ÷ (DIVIDE) |
| 15. STO 4 | 33. RCL 4 |
| 16. RCL 1 | 34. – (MINUS) |
| 17. RCL 3 | 35. f, P/R |
| 18. – (MINUS) | |

To execute this program, all you need to do is enter the coupon rate, the years to maturity, and the yield to maturity. Both of the above interest rate variables should be entered as a decimal. Use the following example to verify that the program is working:

Consider a 14% coupon bond with 5 years until maturity and an 9.5% YTM. The keystrokes are as follows:

0.14 STO 1

5 STO 2

0.095 STO 3

R/S The result is a duration of 4.0004 years.

HP 17BII Duration Formula

From the main screen, press "solve" then

"new." Then enter the following equation:

$(1+Y) \div Y - (((1+Y) + T x (C - Y)) \div (C x ((1+Y)^T - 1) + Y)) = D$ using the keystrokes provided.

HP 17BII	
<i>Keystrokes</i>	<i>Display</i>
[SOLVE]	{NEW}FOR NEW EQUATION
[NEW]	TYPE EQUATION; [INPUT]
((
[WXYZ]	WXYZ OTHER
[Y]	(Y
+	(Y +
1	(Y + 1
)	(Y + 1)
÷	(Y + 1) ÷
[WXYZ]	WXYZ OTHER
[Y]	(Y + 1) ÷ Y
-	(Y + 1) ÷ Y -
((Y + 1) ÷ Y - (
((Y + 1) ÷ Y - ((
((Y + 1) ÷ Y - (((
1	(Y + 1) ÷ Y - ((1
+	(Y + 1) ÷ Y - ((1 +
[WXYZ]	WXYZ OTHER
[Y]	(Y + 1) ÷ Y - ((1 + Y
)	(Y + 1) ÷ Y - ((1 + Y)
+	(Y + 1) ÷ Y - ((1 + Y) +
[RSTUV]	RSTUV OTHER
[T]	(Y + 1) ÷ Y - ((1 + Y) + T
x	(Y + 1) ÷ Y - ((1 + Y) + T x
((Y + 1) ÷ Y - ((1 + Y) + T x (
[ABCDE]	ABCDE OTHER
C	(Y + 1) ÷ Y - ((1 + Y) + T x (C
-	(Y + 1) ÷ Y - ((1 + Y) + T x (C -
[WXYZ]	WXYZ OTHER
[Y]	...+ 1) ÷ Y - (((1 + Y) + T x (C - Y
)	...1) ÷ Y - (((1 + Y) + T x (C - Y)
)	...) ÷ Y - (((1 + Y) + T x (C - Y))
)	... ÷ Y - (((1 + Y) + T x (C - Y)))
÷	...Y - (((1 + Y) + T x (C - Y))) ÷
(... - (((1 + Y) + T x (C - Y))) ÷ (
[ABCDE]	ABCDE OTHER
[C]	...(((1 + Y) + T x (C - Y))) ÷ (C
x	...((1 + Y) + T x (C - Y))) ÷ (C x
(...(1 + Y) + T x (C - Y))) ÷ (C x (
(...1 + Y) + T x (C - Y))) ÷ (C x ((
1	...+ Y) + T x (C - Y))) ÷ (C x ((1
+	...Y) + T x (C - Y))) ÷ (C x ((1 +
[WXYZ]	WXYZ OTHER
[Y]	...) + T x (C - Y))) ÷ (C x ((1 + Y

)	...+ T x (C - Y)) ÷(C x ((1 + Y
[■]Y ^x	...Tx (C - Y)) ÷(C x ((1 + Y) ^
[RSTUV]	RSTUV OTHER
[T]	...x (C - Y)) ÷(C x ((1 + Y) ^ T
-	...(C - Y)) ÷(C x ((1 + Y) ^ T -
1	...C - Y)) ÷(C x ((1 + Y) ^ T - 1
)	...- Y)) ÷(C x ((1 + Y) ^ T - 1)
+	...Y)) ÷(C x ((1 + Y) ^ T - 1) +
[WXYZ]	WXYZ OTHER
[Y]	...)) ÷(C x ((1 + Y) ^ T - 1) + Y
)	...)) ÷(C x ((1 + Y) ^ T - 1) + Y)
=	...) ÷(C x ((1 + Y) ^ T - 1) + Y) =
[ABCDE]	ABCDE OTHER
D	...÷(C x ((1 + Y) ^ T - 1) + Y) = D
INPUT	(Y + 1) ÷ Y - (((1 + Y) + Tx (C - Y...
<u>To verify, calculate using the previous example:</u>	
[CALC]	VERIFYING EQUATION
	0.0000
.14[C]	C = 0.1400
5[T]	T = 5.0000
.095[Y]	Y = 0.0950
[D]	D = 4.0004