
Subject: Bug (still) in NR_QROMB, QROMB
Posted by [mallozzi](#) on Wed, 30 Aug 1995 07:00:00 GMT
[View Forum Message](#) <> [Reply to Message](#)

; There appears to be a bug in the routines NR_QROMB and QROMB if you call
; the functions recursively. I included a test program below.
; I notified RSI several months ago about this, but apparently the error
; never got corrected. Be careful how you construct the calling sequences
; for these routines!

; If you are running IDL 4.0 and want to test the function QROMB (not
; available before 4.0) then uncomment the appropriate cases below.

; -Bob Mallozzi

; ----- CUT -----

; Here is a sample program I used to test NR_QROMB.
; It computes an integral whose integrand contains a second integral:
; $I = \int_0^2 \{ x^2 * [\int_0^1 \{ y^3 * dy \}] * dx \}$
; = 0.66666

; NOTE THE RECURSIVE CALLING SEQUENCE, WHICH PRODUCES THE ERROR.

; Calls to SIMPSON produce the correct result.
; Calls to NR_QROMB, QROMB produce the correct result only if
; one of the calls (it doesn't matter which one) is DOUBLE precision.
; If both calls are DOUBLE or both calls are FLOAT, the result is
; not correct.

; Tested on following machines:
; !VERSION = { vax vms 3.5.1}
; !VERSION = { alpha vms 3.6}
; !VERSION = { alpha vms vms 4.0.1}

; I tested several combinations of the integral limits; this
; did not affect the results.

; Robert Mallozzi

; -----
function func1, x
common data, inner, select

; Get the inner integral
ll = 0.0
ul = 1.0

```

case select of
  1: inner = SIMPSON('func2', ll, ul, TOL = 0.001)
  2: inner = SIMPSON('func2', DOUBLE(ll), DOUBLE(ul), TOL = 0.001)
  3: inner = SIMPSON('func2', DOUBLE(ll), DOUBLE(ul), TOL = 0.001)

  4: inner = NR_QROMB('func2', ll, ul, EPS = 0.001)
  5: inner = NR_QROMB('func2', DOUBLE(ll), DOUBLE(ul), EPS = 0.001)
  6: inner = NR_QROMB('func2', DOUBLE(ll), DOUBLE(ul), EPS = 0.001)

;   7: inner = QROMB('func2', ll, ul, EPS = 0.001)
;   8: inner = QROMB('func2', DOUBLE(ll), DOUBLE(ul), EPS = 0.001)
;   9: inner = QROMB('func2', DOUBLE(ll), DOUBLE(ul), EPS = 0.001)
endcase

return, (x^2) * inner
end
;-----
function func2, y
return, y^3
end
;-----

common data, inner, select

choices = ['Select the integration routines: ', $
           'SIMPSON single, SIMPSON single', $
           'SIMPSON double, SIMPSON double', $
           'SIMPSON single, SIMPSON double', $
           'NR_QROMB single, NR_QROMB single', $
           'NR_QROMB double, NR_QROMB double', $
           'NR_QROMB single, NR_QROMB double']

;   'QROMB single, QROMB single', $
;   'QROMB double, QROMB double', $
;   'QROMB single, QROMB double']

select = WMENU(choices, title = 0, init = 1)

ll = 0.0
ul = 2.0
case select of
  1: BEGIN
    result = SIMPSON('func1', ll, ul, TOL = 0.001)
    print, choices(1)
    END
  2: BEGIN
    result = SIMPSON('func1', DOUBLE(ll), DOUBLE(ul), TOL = 0.001)

```

```

    print, choices(3)
    END
3: BEGIN
    result = SIMPSON('func1', ll, ul, TOL = 0.001)
    print, choices(2)
    END

4: BEGIN
    result = NR_QROMB('func1', ll, ul, EPS = 0.001)
    print, choices(4)
    END
5: BEGIN
    result = NR_QROMB('func1', DOUBLE(ll), DOUBLE(ul), EPS = 0.001)
    print, choices(5)
    END
6: BEGIN
    result = NR_QROMB('func1', ll, ul, EPS = 0.001)
    print, choices(6)
    END

; 7: BEGIN
;     result = QROMB('func1', ll, ul, EPS = 0.001)
;     print, choices(7)
;     END
; 8: BEGIN
;     result = QROMB('func1', DOUBLE(ll), DOUBLE(ul), EPS = 0.001)
;     print, choices(8)
;     END
; 9: BEGIN
;     result = QROMB('func1', ll, ul, EPS = 0.001)
;     print, choices(9)
;     END
endcase

print, ' Numerical result is ', result
print, ' Analytical result is ', (1.0 / 3) * (ul^3 - ll^3) * inner
print

END
;-----

```
