

Complex Variables

Polar and rectangular conversion for the HP-28S

HEWLETT-PACKARD 28S · C. 1989 · NOTEBOOK PAGES 24-25

POLR · arg · DG→RD · RD→DG

THE MANUAL

No manual page survives for these. What follows is the stack convention written in the margin beside each program, and the code as drafted.

POLR

takes a complex number as two reals — real part on level 2, imaginary part on level 1 — and displays it both ways at once: as $a + bi$, then its length, then its angle as a fraction of π .

arg

the argument, taken in degrees and handed to DG→RD. Restores RAD on the way out.

DG→RD

an angle in degrees, on level 1, expressed as a reduced fraction of π .

RD→DG

the inverse: a bare multiple of π back to degrees. From the page — “angle in radians without π : for $3/2 \pi$ enter 1.5 on the stack.”

THE PROGRAMS

```
POLR
« CLLCD DUP2 DUP2
  →STR "i" + " + " SWAP + SWAP →STR SWAP + 1 DISP
  SQ SWAP SQ + √ →STR "length= " SWAP + 3 DISP
  arg "theta=" SWAP + 4 DISP
»

arg
« DEG R→C ARG DG→RD RAD
»

DG→RD
« D→R π / →NUM 1 1
```

```

DO DROP 1 + DUP 3 ROLL DUP 4 ROLL * DUP DUP IP
UNTIL ==
END SWAP 3 ROLL DROP SWAP DUP DUP
IF ABS ≠
THEN SWAP DUP 2 * 3 ROLL + SWAP
ELSE SWAP
END DUP2
WHILE DUP
REPEAT SWAP OVER MOD
END DROP DUP 3 ROLL / 3 ROLL /
SWAP →STR SWAP →STR "/" + SWAP + "π" +
»

RD→DG
« π →NUM * R→D IP
»

```

NOTES ON THIS EDITION

1. These two pages are handwritten working notes rather than a printed listing — the only programs in the notebook that never reached the printer. Read them as a draft.
 2. DG→RD runs across the page break and continues at the top of page 25 under “DG→RD cont...”. Joined up it is complete; an earlier transcription pass stopped at the break and recorded it as unfinished.
 3. This is the “polar graphing” Selden’s 1990 paper names among what the class produced.
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The notebook is the manuscript — handwritten, photocopied, and reproduced exactly as scanned at michaelmorrison.com/downloads/hp28s/complex-variables-notebook.pdf. This is the edited edition. The wording and the voice are the manuscript’s and the program listings are unaltered; where the prose has been corrected, the notes above say what was changed, so the two can be held against each other.