1 SUMMARY

To compute values of the **complete elliptic integral** of the **3rd kind,** viz.

$$\Pi(n, m) = \int_0^{\frac{\pi}{2}} \frac{(1 - m^2 \sin^2 \theta)^{-\frac{1}{2}}}{(1 - n \sin^2 \theta)} \, d\theta \quad 0 \le m^2 \le 1$$

The integral is represented in terms of complete and incomplete elliptic integrals of the 1st and 2nd kind and the subroutines `FB01A` and `FB02A` are used to obtain the required values.

ATTRIBUTES — **Version:** 1.0.0. **Types:** `FB03A`; `FB03AD`. **Calls:** `FB01` and `FB02`. **Original date:** Revised 1967. **Origin:** M.Ruffle*, Harwell.

2 HOW TO USE THE PACKAGE

The single precision version

```
CALL FB03A(EN,EMSQ,PI)
```

The double precision version

```
CALL FB03AD(EN,EMSQ,PI)
```

EN   is a `REAL` (`DOUBLE PRECISION` in the D version) variable which must be set by the user to the floating point value of *n*.

EMSQ is a `REAL` (`DOUBLE PRECISION` in the D version) variable which must be set by the user to the floating point value of m^2. **Restriction:** $0 \le m^2 \le 1$.

PI   is a `REAL` (`DOUBLE PRECISION` in the D version) variable which is set by the subroutine to the computed value of the integral $\Pi(n, m)$.

3 GENERAL INFORMATION

Use of common: none.

Workspace: none.

Other subroutines: it calls library subroutines `FB01A` and `FB02A.`

Input/Output: none.

Restrictions:

$0 \le m^2 \le 1.$

4 METHOD

The integral is rewritten in terms of elliptic integrals of the first and second kinds and these are evaluated using `FB01A` and `FB02A`.