

## 17.6 Selected Solutions (cont'd.)

$$\oint_{\rightarrow}^9 Letters_{LastDeclarationWord} + \ln(JulyVoteDate_{LeeResolution}) + (Yr_{Declaration} - Yr_{BostonMassacre}) d\omega = airplanes$$

## 18 Constitutional Calculus

In 1787, James Madison introduced the concept of the *down integral* through his tireless work on the new United States Constitution. Denoted by the symbol  $\oint_{\downarrow}$ , the *down integral* is analogous to the *right integral* invented for the Declaration of Independence twelve years earlier.

### 18.1 Exercises

Use Madison's calculus to examine the following facets of the the U.S. Constitution:

1. The Presidency

$$\begin{aligned} & \oint_{\downarrow}^5 AnnualPrezSpeechArt.Sec \\ & - \ln(PrezMinResidencyYrs) \\ & + \frac{PrezElectorsAmendment - PrezMaxTerms}{PrezSignatories} d\omega = ? \end{aligned}$$

2. Constitutional signing: A place in history

$$\begin{aligned} & \oint_{\downarrow}^6 CenturiesAfterRoanokeSettlement \\ & + \ln(YearsAfterSamAdamsCircularLetter) \\ & + DaysAfterFriday d\omega = ? \end{aligned}$$

3. Article Functions

$$\begin{aligned} & \oint_{\downarrow}^2 LegislativeBranchArticle \\ & + \ln(StateProtectionArticle) \\ & + AmendmentAllowingArticle d\omega = ? \end{aligned}$$

4. n-States

$$\begin{aligned} & \oint_{\downarrow}^5 InitialHouseReps_{NY} \\ & + \ln(Signatories_{NC}) \\ & + Amendment12RatificationOrder_{NJ} d\omega = ? \end{aligned}$$

5. Bill of Rights

$$\begin{aligned} & \oint_{\downarrow}^1 CivilCaseJuryAmendment \\ & + \ln(FreePressAmendment) \\ & + CruelAndUnusualAmendment d\omega = ? \end{aligned}$$

6. Preamble Positioning

$$\begin{aligned} & \oint_{\downarrow}^5 (People - We) \\ & - \ln(Defence - Union) \\ & + \left( \frac{Provide + Order * Liberty}{Secure + Justice} \right) d\omega = ? \end{aligned}$$