

# The Vulnavian Degree Network Level 2

## Integration - Study Guide

### Task 0298: Differentiation & Integration of Integrals (9 pages)

#### 1. Differentiation of Indefinite Integrals (Pg.1)

Example 1:  $\int e^{px} dx = (1/p)e^{px}$  (Pg.1)

Example 2:  $\int \frac{1}{p^2 + x^2} dx = \frac{1}{p} \tan^{-1} \frac{x}{p}$  (Pg.2)

#### 2. Differentiation of Definite Integrals (Pg.3)

Example 1:  $I(p) = \int_1^{\exp(p)} \cos(px) dx$  (Pg.4)

Example 2:  $\int_0^{\infty} x^n e^{-px} dx$  (Pg.5)

Example 3:  $I(p) = \int_0^{\infty} \frac{e^{-px} \sin x}{x} dx$  (Pg.7)

#### 3. Integration of Definite Integrals (Pg.9)

Example

### Workshop Task 0299:

Differentiation & Integration of Integrals w/s

(Not Included on the Standard Edition CD.)

### Task 0300: Double Integrals (13 pages)

#### 1. Definition of a Double Integral (Pg.1)

#### 2. The Double Integral for a Region R (Pg.3)

Enclosed by a Closed Curve C

#### 3 Properties of a Double Integral (Pg.4)

Example 1:  $I = \iint (2x + y^2) dx dy$  (Pg.5)

Example 2:  $I = \iint \{x^2 + 3y^2\} dx dy$  (Pg.7)

Example 3:  $I = \int_0^{\pi} dx \int_0^{\sin x} \sin x dy$  (Pg.9)

Example 4:  $I = \int_0^1 dy \int_0^{\cos^{-1}y} \sqrt{(\sin x)} dx$  (Pg.10)

Example 5:  $I = \int_0^1 dx \int_{2x}^{\sqrt{3+y^2}} f(x, y) dy$  (Pg.11)

#### 4. Applications of Double Integrals (Pg.12)

Example

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**Task 0300x**: Double Integrals (6 pages)

1. **Transforming to Polar Coordinates in Double Integrals.** (Pg.1)

Example 1:  $I = \iint \{ \sqrt{(x^2 + y^2)} - x \} dx.dy$  (Pg.2)

Example 2:  $I = \iint x^2 dy.dx$  (Pg.4)

Example 3:  $I = \int_0^{\infty} \exp(-x^2) dx$  (Pg.6)

**END OF THE STUDY GUIDE FOR INTEGRATION**