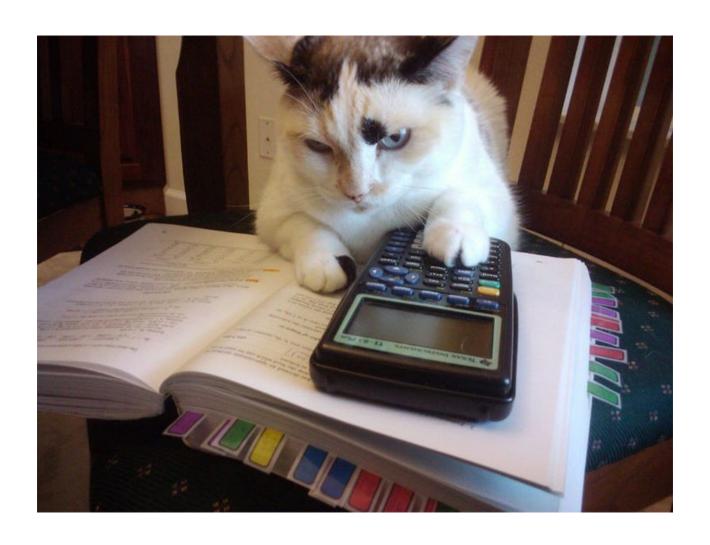
## Speshlist Mathematics

# IA3 Exam Worked Examples



#### 1 Geometric Proofs using vectors

Example 4.5: Prove the diagonals of a parallelogram meet ar right angles if and only if it is a rhombus.		

#### 2 Integration and applications of integration

Example 11.14: Evaluate the following: (a) $\int \cos^2 x  dx$	(c) $\int \sin(2x)\cos(2x)dx$	(e) $\int \sin^3 x  \cos^2 x  dx$
(b) $\int \tan^2 x \ dx$	$(d) \int \cos^4 x \ dx$	

Example 11.24:
Example 11.24: Determine $\int x^2 e^x dx$ .

### 3 Vector calculus

Example 8.18: The position vector of a particle at tiem $t$ is given by $\mathbf{r}(t) = 2\sin(2t)\mathbf{i} + \cos(2t)\mathbf{j} + 2t\mathbf{k}$ , where $t \ge 0$
(a) Determine the velocity at time $t$
(b) Determine the speed of the particle at time $t$
(c) Determine the maximum speed
(d) Determine the minimum speed