

Part II - Calculations

1. (12 points) Match the indefinite integral with the correct anti-derivative. Place the correct letter in the blank before the integral:

_____ $\int \frac{1}{a^2+u^2}$	A. $\sin u + C$
_____ $\int a^u du$	B. $-\sin u + C$
_____ $\int \csc u \cot u du$	C. $\ln \cos u + C$
_____ $\int \tan u du$	D. $-\ln \cos u + C$
_____ $\int \sec^2 u du$	E. $\tan u + C$
_____ $\int \cos u du$	F. $\sec u + C$
	G. $\sin^{-1} \frac{u}{a} + C$
	H. $\frac{1}{a} \tan^{-1} \frac{u}{a} + C$
	I. $-\csc u + C$
	J. $-\cot u + C$
	K. $\frac{a^u}{\ln a} + C$

2. Find the following integrals:

(a) (10 points) $\int e^x \sin x dx$

(b) (6 points) $\int 10^{2\theta} d\theta$

(c) (6 points) $\int \sin^3 x \cos x dx$

(d) (12 points) $\int \frac{1}{x^4+x^2} dx$

(e) (6 points) $\int x \tan(x^2) dx$

3. (12 points) Calculate the average value of $f(x) = x^2 e^{4x}$ on the interval $[0, 2]$.

4. (6 points) Calculate $\int \frac{dx}{\sqrt{x^2 - 1}}$

5. (6 points) Calculate $\int_3^5 \frac{1}{x-4} dx$