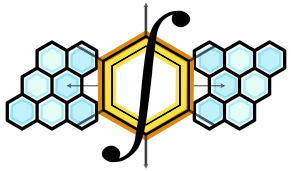


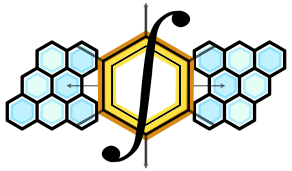
Grand Final

MWIT-KVIS Integration Bee

November 12, 2023

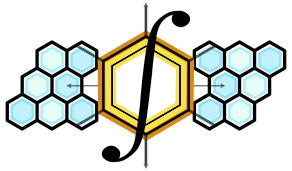
Rules

- 4 problems (+ sudden death)
- 4 minutes per problem
- CIRCLE your final answer



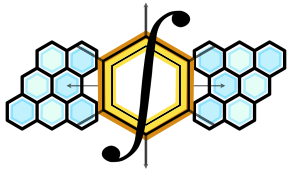
Problem 1

$$\int_{-\infty}^{\infty} \frac{dx}{(2x^2+5+\sqrt{5})^2(2x^2+5-\sqrt{5})^2-16}$$



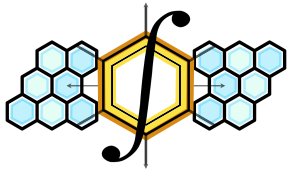
Problem 1 Answer

$$\int_{-\infty}^{\infty} \frac{dx}{(2x^2+5+\sqrt{5})^2(2x^2+5-\sqrt{5})^2-16} = \boxed{\frac{\pi}{192}(1-3\sqrt{2}+2\sqrt{3})}$$



Problem 2

$$\int_0^{2\pi} \sqrt{1+\cos x+\sqrt{2+2\cos x}}\,dx$$

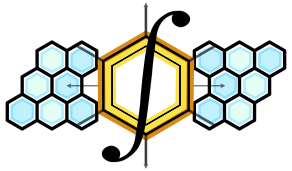


Problem 2 Answer

$$\int_0^{2\pi} \sqrt{1+\cos x+\sqrt{2+2\cos x}}\,dx = \boxed{2\sqrt{2}\pi}$$

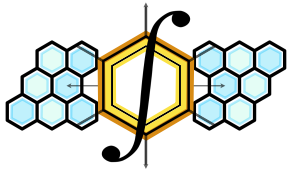
Problem 3

$$\int_0^1 \sum_{n=1}^{\infty} \frac{\lfloor (-2)^n x \rfloor}{4^n} \, dx$$



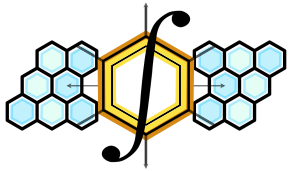
Problem 3 Answer

$$\int_0^1 \sum_{n=1}^{\infty} \frac{\lfloor (-2)^n x \rfloor}{4^n}\, dx = \boxed{-\frac{1}{3}}$$



Problem 4

$$\int_0^{\pi/4} \frac{dx}{\sqrt{2} + \sqrt{3}\tan 3x}$$

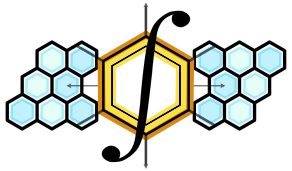


Problem 4 Answer

$$\int_0^{\pi/4} \frac{dx}{\sqrt{2}+\sqrt{3}\tan 3x} = \boxed{\frac{\pi}{10\sqrt{2}} + \frac{1}{5\sqrt{3}} \ln\left(\frac{\sqrt{3}-\sqrt{2}}{2}\right)}$$

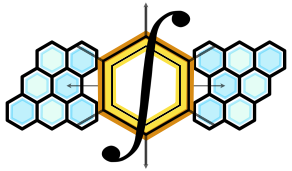
Sudden Death Problem 1

$$\int_0^{\pi} \frac{\cos 2x}{6 + 4\sin x + 4\cos x + \sin 2x}\, dx$$



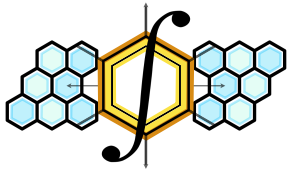
Sudden Death Problem 1 Answer

$$\int_0^{\pi} \frac{\cos 2x}{6 + 4\sin x + 4\cos x + \sin 2x}\, dx = \boxed{-\frac{\ln 5}{2} + 2\arctan\frac{1}{2}}$$



Sudden Death Problem 2

$$\int_0^{3/4} \frac{x^2}{\sqrt{\sqrt{x^2+1}-x}}\,dx$$



Sudden Death Problem 2 Answer

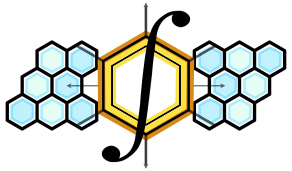
$$\int_0^{3/4} \frac{x^2}{\sqrt{\sqrt{x^2+1}-x}}\,dx = \boxed{\frac{799\sqrt{2}-512}{3360}}$$

Sudden Death Problem 3

$$\int_0^3 \cos\left(\lfloor 2023x \rfloor + \frac{1}{2}\right)\, dx$$

Sudden Death Problem 3 Answer

$$\int_0^3 \cos\left(\lfloor 2023x \rfloor + \frac{1}{2}\right)\, dx = \boxed{\frac{\sin(6069)}{4046\sin\left(\frac{1}{2}\right)}}$$

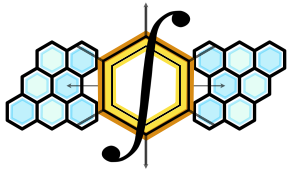


Sudden Death Problem 4

$$\int \left(\sin^{2566} x + \frac{2565}{2566} \sin^{2564} x \right) dx$$

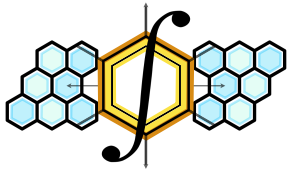
Sudden Death Problem 4 Answer

$$\int \left(\sin^{2566} x + \frac{2565}{2566} \sin^{2564} x \right) dx = \boxed{-\frac{1}{2566} \sin^{2565} x \cos x}$$



Thank you for your integration

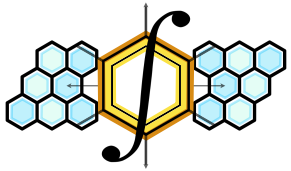
See you again at the 2nd MWIT-KVIS Integration Beeeeeeee.



End Credit

We would like to thank the following problem proposers

- Thitiwat Kosolpattanadurong
- *PolarBear*
- Patthadon Phengpinij
- Sirawit Pipittanaban
- Wasanont Pongsawat
- Chanatip Sujsantinukul
- Tanupat Trakulthongchai



End Credit

We would like to thank the following organisers

- Pannathut Chitpakdee
- Thitiwat Kosolpattanadurong
- *PolarBear* (judge)
- Rathanon Makaramanee
- Tisorn Na Phattalung
- Patthadon Phengpinij
- Wasanont Pongsawat (judge)
- Thawin Serivivatanavongse
- Tanupat Trakulthongchai