INTEGRATION BEE Mathematics Club

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Question 3

Question 2

Question

Question

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Question

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Question 10

Question 1

Question 12

# INTEGRATION BEE Round 2

Mathematics Club

CFI, IITM

September 4, 2024



Mathematics Club

#### Instructions

- Question 0
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### Connect to one of three networks as informed:

Instructions

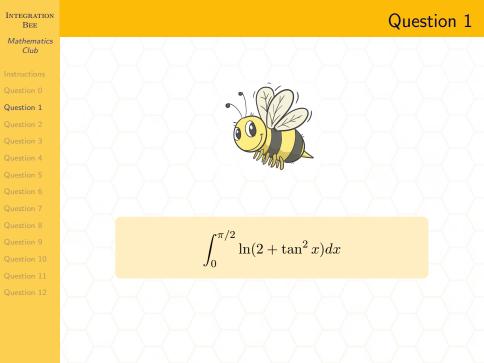
SSID1 : password1

SSID2 : password2

SSID3 : password3

Then navigate to http://intbee.arpa/





Mathematics Club

Instructions Question 0 Question 1

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Find the value of

$$\int_{\pi/6}^{\pi/2} \frac{(\cos(x))^{\psi^2}}{(\sin(x))^{\psi}} (1 + \csc^2(x)) \, dx$$

where  $\psi \,=\, 1+\sqrt{2}$ 

# INTEGRATION **Question 3** Bee **Mathematics** Club Question 3 Find the value of $\int_0^1 (-1)^{\left\lfloor \frac{1}{x} \right\rfloor} dx$

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### Find the value of

$$\int_{-\infty}^{a} \frac{\sin^{-1}(e^x) + \sec^{-1}(e^{-x})}{(\cot^{-1}(e^{-a}) + \tan^{-1}(e^x))(e^x + e^{-x})} dx$$

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If 
$$\alpha = \int_0^\infty \frac{\{x\}^{\lfloor x \rfloor}}{\lfloor x \rfloor!} dx$$

Find the value of 
$$\frac{2}{\alpha} \int_0^{\lfloor \alpha \rfloor} x e^{\log \lfloor x + 1 \rfloor + x^2} dx$$

# Question 6



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$$\int_{0}^{2} \log_{9}(x + \sqrt{x^{2} + 1}) \, dx + \int_{0}^{\log_{9}(2 + \sqrt{5})} \frac{9^{x} - 9^{-x}}{2} \, dx$$

#### Mathematics Club

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# Question 7



$$\int_{0}^{\pi/4046} \sin(2024x) \sin^{2022} x dx$$

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### Find the value of

$$\int_{-\frac{1}{2}}^{\frac{1}{2}} \sqrt{x^2 + 1 + \sqrt{x^4 + x^2 + 1}} \, dx$$

# Question 9



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$$\int_{0}^{\frac{\pi}{4}} e^{x \sin(x)} (\tan(x) + \tan(x) \sec(x) + x) \, dx$$

# Question 10



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$$\int_0^1 \ln\left(x - x^2\right) \left[ \left( \ln\left(\frac{x}{1 - x}\right) \right)^2 + \ln(x)\ln(1 - x) \right] dx$$

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$$\int_{0}^{2\pi} \frac{\cos(2x)\cos(4x)\cos(6x)}{1 + e^{2\sin(2x)}} dx$$

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### Find the value of

$$\int_0^1 \binom{n}{k} x^k (1-x)^{n-k} \, dx$$