\documentclass{article}

\usepackage[utf8]{inputenc}

\begin{document}

\section{Task-1}

\[ \int\_{1}^{exp(\pi/8)} \frac{sin^3(8ln(x))cos^7}{x} \,dx \]

\[ \int\_{1}^{exp(\pi/8)} \frac{cos^7 (4ln(x)sin^3(8ln(x)}{x} \,dx \]

Let,

\\$u = 4ln(x)$ \\du/dx = 4/x\\

So,

\[1/4 \int\_{1}^{exp(\pi/8)} cos^7(u)sin^3(2u) \,du \]

We know,

\\$[sin(2u)=2cos(u)sin(u)], sin^2(u)=1-cos^2(u)$\\

$$1/4 \int\_{1}^{exp(\pi/8)} (-8cos^10(u)(cos^2(u)-1)) sin(u)\,du\_ {=====(i)}$$\\

\\Let,

\\v = cos(u)

\\ \,dv/\,du = -1/sin(u)

\\So, \,du = -1/sinu\\

\[ 8\int v^{10} ((v^2)-1) \,dx \]

\[ 8\int (v^{12}-v^{10}) \,dx \]

\[\int \frac{v^{13}}{13} \,dv - 8 \int \frac{v^{11}}{11}\,dv \]

\\After implementing on (i),

\[{1/4}\int\_{1}^{\exp(\pi/2)}cos^7(u)sin^3(u)du\]

\[[{2cos^{13}(u)/13} - {2cos^{11}(4ln(x))/11}+c]\_{1}^{\exp(\pi/2)} \]

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\section{Task-2}

Given that,

\[ \int{\frac{cos^3(x)}{sin(x)}dx} \]

\[\int \frac{cos^3 (x)-3cos(x)sin^2x}{sin(x)}dx\]

\[-\int \frac{3cos(x)sin(x)-cos^3(x)}{sin(x)}dx\]

\[-\int \frac{(4sin^2-1) cos(x)}{sin(x)}dx\]

Let,

\\u = sin(x)\\

\\ du/dx = cos(x)\\

\\ dx = {1/cos(x)}\,dx\\

\\So,

\[\int \frac{4u^2-1}{u}\,du\]

\[\int (4u-\frac{1}{u})\,du\]

\[4\int(u)\,du - \int \frac{1}{u}\,du \]

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