Time: 60 minutes **MID2** **Max Marks**: 40 points

Q1-Use the following values and five-digit rounding arithmetic

x	0.0	0.2	0.4	0.6	0.8
$f(x)$	1.00000	1.22140	1.49182	1.82212	2.22554

a. Use Newton forward difference formula to approximate $f(0.05)$ **Ans : 1.05126**

b. Use Newton backward difference formula to approximate $f(0.65)$ **Ans: 1.91545**

Q2-Consider $f(x) = e^{2x} - cos2x$

a. Approximate $f'(-0.2)$ using three-point endpoint and mid-point formula with $h = 0.1$

b. Compute the true error and bound error of each method and display in tabular form.

Tabular form

	3 point (end point)	3 point (mid point)
Approximate	**0.53430**	**0.57590**
True value	**0.56180 (calculator)**	
True error	**0.0275**	**0.01410**
Bound error	**0.02826**	**0.01485**

Q3-Approximate $\int_0^{\pi/2} sin^2 x dx$, using Closed-Newton cotes formula for $n = 1,2,3$

n=1 h=$\pi/2$	**n=2 h=$\pi/4$**	**n=3 h=$\pi/6$**
0.78540	**0.78540**	**0.78540**

Q4-Approximate $\int_0^2 x^2 \ln(x^2+1)\, dx$, $where\ h = 0.25$

a. Composite Simpson's rule

b. Composite mid point rule

n	0	1	2	3	4	5	6	7	8
x_n	0	0.25	0.5	0.75	1	1.25	1.5	1.75	2
$f(x_n)$	0	0.00379	0.05579	0.25104	0.69315	1.47029	2.65197	4.29301	6.43775

True value (calculator)	3.10930
Composite Simpson's rule	3.10934 (n=8)
Composite Mid point rule	3.00907 (n=6)