

**Midterm exam106**

**Question 1(2+3+2)**

a) Use Simpson's rule, with  $n = 4$ , to approximate  $\int_0^4 \sqrt{8 + x^3} dx$

b) Evaluate the integral  $\int \frac{e^x \ln(e^x + 1) dx}{e^x + 1}$

c) Find  $\frac{dy}{dx}$  if  $y = (1 + x^2)^{2x+1}$

**Question 2(3+2+3)**

a) Evaluate the integral  $\int \frac{2^x dx}{\sqrt{4-4^x}}$

b) Compute the integral  $\int \frac{x^4 dx}{\sqrt{x^{10}-1}}$

c) Find the indefinite integral  $\int \frac{dx}{x\sqrt{1-x^6}}$

**Question 3(3+3+3)**

a) Compute  $\lim_{x \rightarrow \infty} (1 + 3x)^{\frac{1}{x}}$

b) Evaluate the integral  $\int e^x \sin 4x dx$

c) Find  $\int (\cos x)^5 (\sin x)^4 dx$

**Question 4(3+3)**

a) Evaluate the integral  $\int x^3 \sqrt{x^2 - 4} dx$

b) Compute the indefinite integral  $\int \frac{2x^2 - 11x + 9}{x^3 - 6x^2 + 9x} dx$