

Math106 Midterm2

Question 1(2+3+2)

a) Find the  $\lim_{x \rightarrow 0} \frac{\int_0^x \sin(t^2) dt}{x^3}$

b) Evaluate the indefinite integral  $\int \cosh^{-1}(x) dx$

c) Compute the integral  $\int (\sin x)^3 (\cos x)^7 dx$

Question 2(3+3+3)

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

b) Find  $\int \frac{dx}{x^4+x^2}$

c) Compute  $\int \frac{dx}{x^{1/6}+x^{1/3}}$

Question 3(3+3+3)

a) Find  $\int \frac{dx}{3+\cos x+2 \sin x}$

b) Show that the integral  $\int_1^{\infty} \frac{\ln x}{x^2} dx$  converges and find its value.

c) Sketch the region bounded by the curves  $x = y^2$ ,  $x = 8 - y^2$ , and find its area.