For questions: at52@rice.edu April 15

EXERCISE SHEET : FUNDAMENTAL THEOREM OF CALCULUS B

1. Compute the antiderivative of the following functions :

i) $f(x) = \frac{1}{\sqrt{1-x^2}}$

ii) $f(x) = \frac{1}{1+x^2}$

iii) $f(x) = \frac{1}{\sqrt{1-9x^2}}$

iv) $f(x) = \frac{\arcsin(x)}{\sqrt{1-x^2}}$

v) $f(x) = \frac{e^x}{1+e^{2x}}$

vi) $f(x) = \frac{e^x \arccos(e^x)}{\sqrt{1-e^{2x}}}$

2. Consider the function $f(x) = \int_{-x}^{x} \sin(t^2)$.

i) Find the critical points of $f(x)$ in the interval $[-\pi, \pi]$.

ii) Find the inflection points in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

3. Compute the derivative of the following functions

i) $F(x) = \int_1^x e^{-t^2}\ dt$

ii) $F(x) = \int_x^{2x} t\ dt$

iii) $F(x) = \int_0^{\sqrt{x}} t\ dt$

iv) $F(x) = \int_{\cos(x)}^1 \sqrt{1-t^2}\ dt.$