

## MATH 1700 Assignment 4

1. In all questions (a)-(d) explain why those integrals are Improper Integrals. Do the following integrals (a)-(d) converges? If so, to what? Explain.

a)  $\int_0^4 \frac{6x-1}{\sqrt{x}} dx$

b)  $\int_0^1 \frac{e^x}{\sqrt{e^x-1}} dx$

c)  $\int_0^\infty \frac{1}{(2x+1)(x+1)} dx$

d)  $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sqrt{\cos x}} dx.$

e) By using the **Comparison test** determine whether the improper integral  $\int_1^\infty \frac{1+|\sin x|}{1+x^2} dx$  converges or diverges.

2. Find the **area** of the surface obtained by rotating the following curves around  $x$ -axis.

a)  $y = \frac{x^3}{3}, 0 \leq x \leq 1$

b)  $y = \frac{1}{2}(e^x + e^{-x}), 0 \leq x \leq 1$

c)  $y = \cos x, 0 \leq x \leq \frac{\pi}{2}$

d)  $y = e^x, 0 \leq x \leq 1.$

3. Calculate the **length** of the arc  $C$  given by the equation:

a)  $y = e^x + \frac{1}{4}e^{-x}, 0 \leq x \leq 1$

b)  $y = (\frac{x}{2})^2 - \ln \sqrt{x}, 1 \leq x \leq e$

c)  $y = \ln(1 - x^2), 0 \leq x \leq \frac{1}{2}$

d)  $y = \ln(\cos x), 0 \leq x \leq \frac{\pi}{2}.$