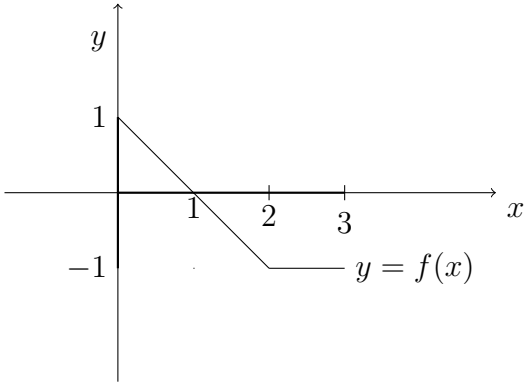
MATH 1700 Assignment 1

The values for each question are in brackets to the left of each question. Please show ALL your work to get full credits.

[4] 1. The graph of the function $y = f(x)$ is given below. **Only your answers will be marked**. $f(0) = 1$ and $f(2) = f(3) = -1$.



(a) $\int_0^1 f(x)dx$ =.....

(c) $\int_0^2 f'(x)dx$ = ...

(b) $\int_0^3 f(x)dx$ =.....

(d) $\lim_{h\to 0} \frac{f(1+h)-f(1)}{h}$ = ...

2. Differentiate the following functions (with respect to x). **Do not simplify**.

[3] (a) $y = \int_1^{x^2} \frac{1}{t^2+1}dt$

[4] (*b*) y=$(x^2 + 1)\log_2 x$

[4] (*c*) y=$e^{\frac{\cos x}{x}}$

[4] (d) $y = x^x$

3. [2] (a) Compute the definite integral $\int_0^1 \frac{1}{x+1}dx$.

[4] (b) Use **(a)** and Definition 2 (Section 5.1) to find the following limit :

$$\lim_{n\to\infty}[\frac{1}{n+1}+\frac{1}{n+2}+.....+\frac{1}{2n}]$$

4. Find the following integrals:

[5] (a) $\int(e^x-\csc x\cot x+\frac{x^7-\pi}{x})dx$

[4] (b) $\int_0^1(8x^7-\frac{1}{2\sqrt{x}}+7)dx$

[5] (c) $\int_0^1 x^3(x^2+1)^{75}dx$

[6] (d) $\int_0^{\frac{\pi}{4}}\frac{\sec^2 x}{\sqrt[3]{\tan x+1}}dx$

5. [5] Compute $\int_{-1}^1 f(x)dx$, where $f:[-1,1]\to\mathbb{R}$ is given by:

$$f(x)=\begin{cases}\sin x & \text{if } -1\le x\le 0\\ x & \text{if } 0<x\le 1.\end{cases}$$

6. [4] Sketch the graph of the following curves: $y=2x-x^2$ and $y=-x$.

[6] Find the area bounded by the curves $y=2x-x^2$ and $y=-x$.

Bonus question

7. [3] Assume f is continuous and $\int_0^1 xf(2x^2+1)dx=1$. Find $\int_1^3 f(x)dx$.

Total value of all questions is 60 marks.