MAC 2311 Quiz 7 **Name:**

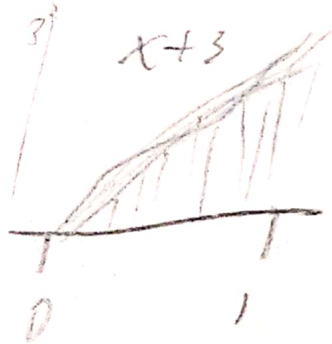
Instructions:

- *Show the steps of your work.*
- *Simplify your answers.*
- *Use clear and correct mathematical natation.*
- *Graphing tool is not allowed to use while taking this test.*
- *Turn off your phone.*

(1) Consider $f(x) = x + 3$ on the interval $[0, 1]$ (3 pts).
   (a) Find the right Riemann sum with n rectangles. Simplify the expression as much possible.
   (b) Approximate the area by taking $n = 50$ and use the expression from (a).
   (c) Take a limit of the sum as $n \to \infty$ to calculate the exact area under the curve.

$\beta = \frac{1}{n}$ $h = \left(\frac{1}{n} + 3\right)$

$b \cdot h = A$



$X = \frac{1}{n} i$ $\left(\frac{1}{n} i + 3\right) = \text{Area}$

$\frac{1}{n^2} i + \frac{3}{n}$

$\sum_{i=1}^{n} \frac{1}{n^2} i + \sum_{i=1}^{n} \frac{3}{n}$

$\frac{1}{n^2} \sum_{i=1}^{n} i + \frac{3}{n} \sum_{i=1}^{n} 1$

$\frac{1}{n^2} \cdot \frac{n(n+1)}{2} + \frac{3}{n} \cdot n$

$\frac{n^2}{2n^2} + \frac{n}{2n^2}$ $\boxed{\frac{n^2+n}{2n^2} + 3}$

$\frac{1}{2} + \frac{1}{2n}$ $\frac{1}{2n} + 3 + \frac{1}{2}$

$\frac{7}{2} + \frac{1}{100}$

b. $\boxed{\frac{351}{100}}$

$\lim_{n \to \infty} \frac{7}{2} + \frac{1}{2n}$

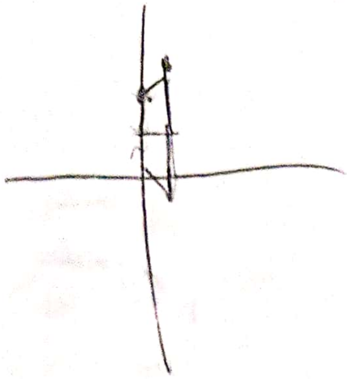
$\frac{7}{2} + 0$

c. $\frac{7}{2}$

a. $\frac{7}{2} + \frac{1}{2n}$

(2) Graph the function $f(x) = x + 3$. Then use **geometry** to find the area of the region between $f(x)$ and the x-axis, for $0 \leq x \leq 1$. Compare with the result from (1)c (1 pts).

0, 1



$b = \frac{1-0}{1}$ $h=4$

$6 = A$

$h \times \frac{a+b}{2}$ $A = 1 \times \frac{3+4}{2} = \frac{7}{2}$

area

(3) Simplify the following expressions by using the Fundamental Theorem of Calculus part 1 (4 pts).

(a) $\frac{d}{dx}\int_1^x \ln t\, dt$

$\ln t(t) - t + C$

$(\ln x)x - x + 1$

(b) $\frac{d}{dx}\int_1^{\sin x} \ln t\, dt$

$\ln(\sin(t\ 1)(\sin(x)) - \sin($

$\ln(t)t - t$

$\ln(\sin x)\sin x - \sin x$ $\ln(1)\cdot 1 - 0 - 1$

$+1$

(4) Evaluate $\int_0^{\pi} \frac{\pi}{4} \sin x\, dx$ with an exact value (2 pts).

$\int_0^{\pi} -\frac{\pi}{4}\cos x + C$

$\frac{\pi}{4} + \frac{\pi}{4}$ $\frac{2\pi}{4}$

$\frac{\pi}{4} \cdot 1$

$-\frac{\pi}{4}\cos(\pi) + \frac{\pi}{4}\cos(0)$

$\frac{\pi}{2}$