

## MA261 Final Exam Review Problems

Format: Choose 5 out of 6 problems (worth 20 pts each) + 1 bonus problem

**I.** Choose any problem from Exam 1 and rework it. (Do them all if necessary)

**II.** Given the functions  $y_1 = x+2$ ,  $y_2 = x$ ,  $y_3 = x^3$ . Find the area of the region by evaluating both a  $dx$  and a  $dy$  integral

**III.** Given the function  $f(x) = \frac{\ln x}{\sqrt{x}}$  find the volume generated by rotating the graph around the  $x$ -axis from  $x = 1$  to  $x = 2$

**IV.a)** Use L'Hopital's Rule to evaluate:  $\lim_{x \rightarrow k} \frac{\sqrt[3]{x} - \sqrt[3]{k}}{x - k}$

b.) Use L'Hopital's Rule to evaluate:  $\lim_{x \rightarrow \infty} \frac{e^{3x}}{x^3}$

c.) Evaluate:  $\int_a^b \frac{x+1}{3x^2+6x+3} dx$

**V.a)** Show that:  $[a + \ln|\cos x|]\cos x + (b+x)\sin x$  satisfies the differential equation:  $y'' + y = \sec x$

b.) Evaluate  $\int \frac{1-x}{\sqrt{1-x^2}} dx$

c.) Evaluate:  $\int \frac{\arcsin\left(\frac{x}{2}\right)}{\sqrt{4-x^2}} dx$

**VI.a)** Evaluate  $\int x^2 \cos 2x dx$  **by parts**

b.) Evaluate:  $\int \frac{x}{x^2+2x+5} dx$