Name:_____

Student Number:_____

Show all your work and give reasons for your answers. Good luck!

(1) Evaluate the following integrals:

(a) $\int x(x^2-5)^4\,dx$

(b) $\int \tan^5(x)\sec^2(x)\,dx$

(c) $\int x^2\sin(x)\,dx$

(d) $\int \frac{1}{x^2-1}\,dx$

(2) Use the midpoint rule and a partition using 4 intervals (n=4) to approximate the value of the definite integral $\int_0^1 e^{-x^2}\,dx$. Estimate the error. **You do not need to multiply and add all the numbers; just write them down!**

(3) Find the area between the graphs of the functions $y = x^2 - 2$ and $y = x$.

(4) **Set up (but do not evaluate)** an integral for the volume of revolution obtained by rotating the area bounded by the graph of $y = \sin(x)$, the line $y = 2$ between $x = 0$ and $x = 10$ about the line $y = -5$.

(5) Find the radius and interval of convergence of the series $\sum_{n=0}^{\infty}(-1)^n \frac{(x-5)^n}{n^2}$

(6) Find the MacLaurin series for the function $f(x) = e^{-x^2}$ and use this series to give the exact answer to $\int_0^1 e^{-x^2}\,dx$. What is the error if you only add the first 4 terms of this series? (Compare this to the error in Problem 2; which method is better?)

(7) Find an equation for the line of intersection of the planes $3x - y + z = 1$ and $x - 2y + z = 2$.

(8) Find the equation of the plane through the point $(-1, 1, 2)$ and perpendicular to the line

$$\begin{cases} x = 1 + t \\ y = 2 - t \\ z = 1 - 2t \end{cases}$$

(9) Draw the graph of the function $z = f(x, y) = 1 - \frac{1}{2}x - \frac{1}{3}y$.

(10) Find the distance from the point $(3, -1, 4)$ to the plane $2x - y + z = 2$ using vectors.