Name:_____

Student Number:_____

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

(1) Evaluate the following integrals:

(a) $\int \sqrt{x}(x^2 + x^{-5})\,dx$

(b) $\int 3x^5(x^6 + 4)^{25}\,dx$

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

(d) $\int \frac{4}{x^2+1}\,dx$

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

(2) Use the right endpoint rule and a partition using 4 intervals (n=4) to approximate the value of the definite integral $\int_0^{1/10} \sin(x^2)\,dx$. **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 $x = y^2$ 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 $y = \tan(x)$, the line $y = 2$ between $x = 0$ and $x = \pi/4$ about the line $x = -5$.

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

(6) Find the MacLaurin series for the function $f(x) = \sin(x^2)$ and use this series to give the exact answer to $\int_0^{1/10} \sin(x^2)\,dx$. What is the error if you only add the first 4 terms of this series?

(7) Find an equation for the line of intersection of the planes $2x-y+z=5$ and $-x+y=4$

(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) Convert the coordinates of the point $(1,2,3)$ from Cartesian coordinates to:
   (a) Cylindrical coordinates,
   (b) Spherical coordinates.

(10) Find the distance from the point $(3, -1, 4)$ to the line

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

using vectors.

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