(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
\[
\begin{aligned}
  x &= 1 + t \\
  y &= 2 - t \\
  z &= 1 - 2t
\end{aligned}
\]

(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

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\begin{align*}
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    y &= 2 - t \\
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\end{align*}
\]

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

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