

Assignment on Industrial Mathematics 2

Answer the following questions!

1. Find the equation of the normal to the curve $y = \frac{3x}{2x^2+2}$ at the point (2, 1) and the equation of the tangent at the origin.
2. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$
 - a. $4x^2 + 3xy + 5y^2 = 6$
 - b. $(3x + 2y)(4x - 5y) = 4$
3. Determine the following integrals:
 - a. $\int \frac{2x-1}{x^2-8x+15} dx$
 - b. $\int \frac{2x^2+x+1}{(x-1)(x^2+1)} dx$
4. An insulating rod of length 3 m and thin enough to be approximated by a line lies in an environment that induces a charge on its surface. If the rod lies along the z-axis between $z = 3$ m and $z = 6$ m and is subject to a charge density:
 $\rho = 4z^3$ ($\mu\text{C}/\text{m}$) between the values $z=3$ and $z=6$ and
 $\rho = 0$ ($\mu\text{C}/\text{m}$) outside that range,
find the total charge.

Good luck!