

Assignment # 3

Q1: The velocity constant k of a given chemical reaction is given by:

$$kt = \int \left(\frac{1}{(3 - 0.4x)(2 - 0.6x)} \right) dx$$

where $x=0$ when $t=0$. Show that: $kt = \ln \left\{ \frac{2(3-0.4x)}{3(2-0.6x)} \right\}$

Q2: Find $\int \frac{(3+6x+4x^2-2x^3)}{x^2(x^2+3)} dx$

Q3: Determine $\int \frac{dx}{7-3\sin x+6\cos x}$

Q4: Determine if the following integral is convergent or divergent. If it is convergent find its value.

$$\int_{-\infty}^{\infty} x e^{-x^2} dx$$

Q5: Determine if the following integral converges or diverges. If the integral converges determine its value.

$$\int_0^4 \frac{x}{x^2 - 9} dx$$

Q6: Determine the area of the region bounded by

$$y = x^2 + 2, y = \sin x, x = -1 \text{ and } x = 2.$$

Q7: Determine the area of the region bounded by

$$x = e^{1+2y}, x = e^{1-y}, y = -2 \text{ and } y = 1.$$

Q8: Sketch the region enclosed by the curves and find its area.

$$y = 2 + |x - 1| \text{ and } y = -\frac{1}{5}x + 7.$$

Q9: Use the method of disks/rings to determine the volume of the solid obtained by rotating the region bounded by $y = 2x^2$ and $y = x^3$ about the x-axis.

Q10: Determine the volume of the solid obtained by rotating the portion of the region bounded by $y = \sqrt[3]{x}, y = \frac{x}{4}$ quadrant about the y-axis.