BBMerlion

Math A Level

Ghifari Rahadian

QUIZ 3

Integral and McLaurin Series

Differential Equation

Permutation and Combination

Question 1

Evaluate the following integrals:

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

$$\int \frac{(\ln x)^{-3}}{x} dx$$

$$\int_1^8 \frac{\log_4 \theta}{\theta} d\theta$$

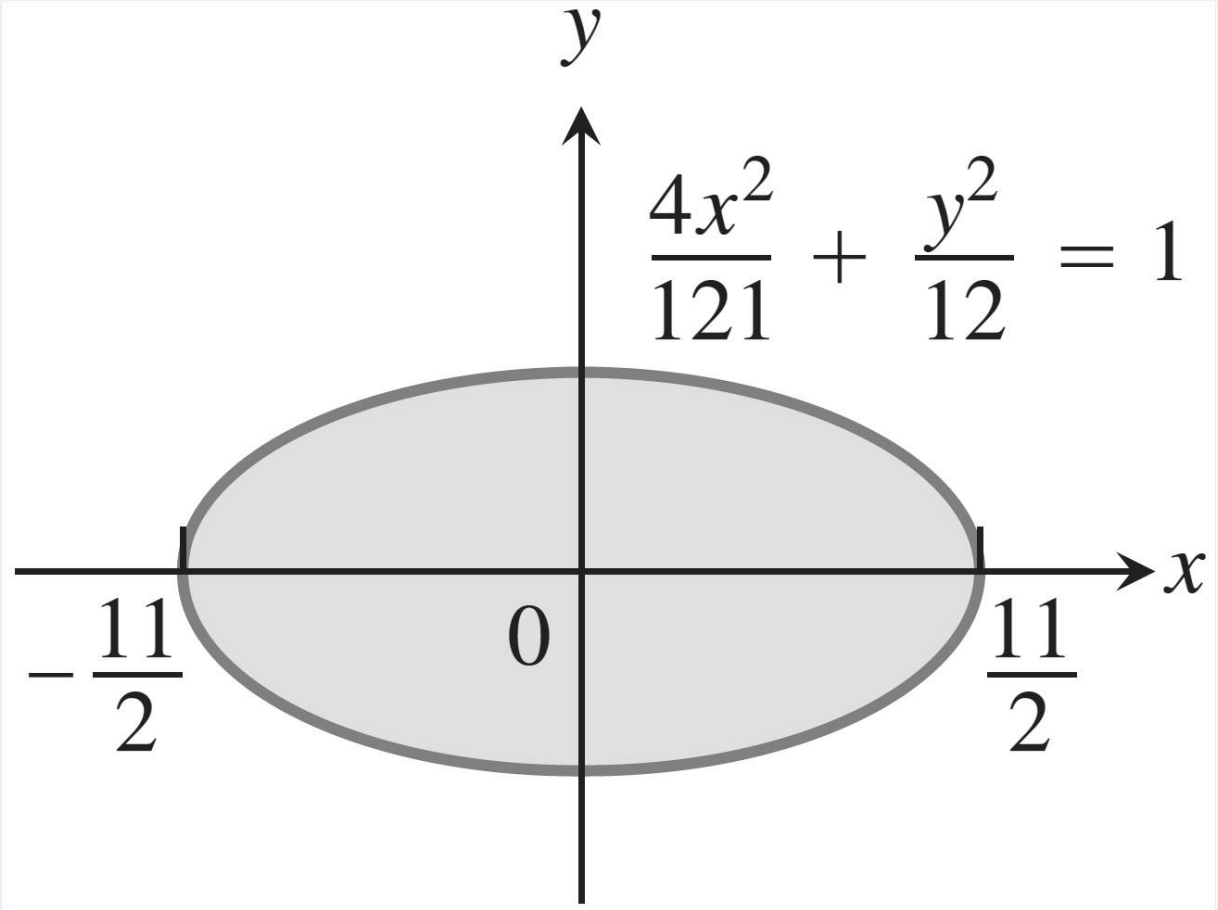
$$\int_0^{\pi/3} \frac{\tan \theta}{\sqrt{2 \sec \theta}} d\theta$$

Question 2

- a. Find the volume of this solid: the base of the solid is the region in the first quadrant between the line $y = x$ and the parabola $y = 2\sqrt{x}$. The cross-sections of the solid perpendicular to the x-axis are equilateral triangles whose bases stretch from the line to the curve.

- b. The profile of a football resembles the ellipse shown here. Find the football's volume to the nearest cubic inch.

Question 2



Question 2

c. Find the first 3 terms in the Maclaurin series for $\frac{x}{\sqrt{1-x^2}}$

Question 3

a. Solve these differential equations: (527)

$$t\frac{dy}{dt} + 2y = t^3, \qquad t > 0, \qquad y(2) = 1$$

$$(t+1)\frac{ds}{dt} + 2s = 3(t+1) + \frac{1}{(t+1)^2}, \qquad t > -1$$

b. If the switch is thrown open after the current in an RL circuit has built up to its steady-state value I=V/R. the decaying current (see accompanying figure) obeys the equation

$$L\frac{di}{dt} + Ri = 0$$

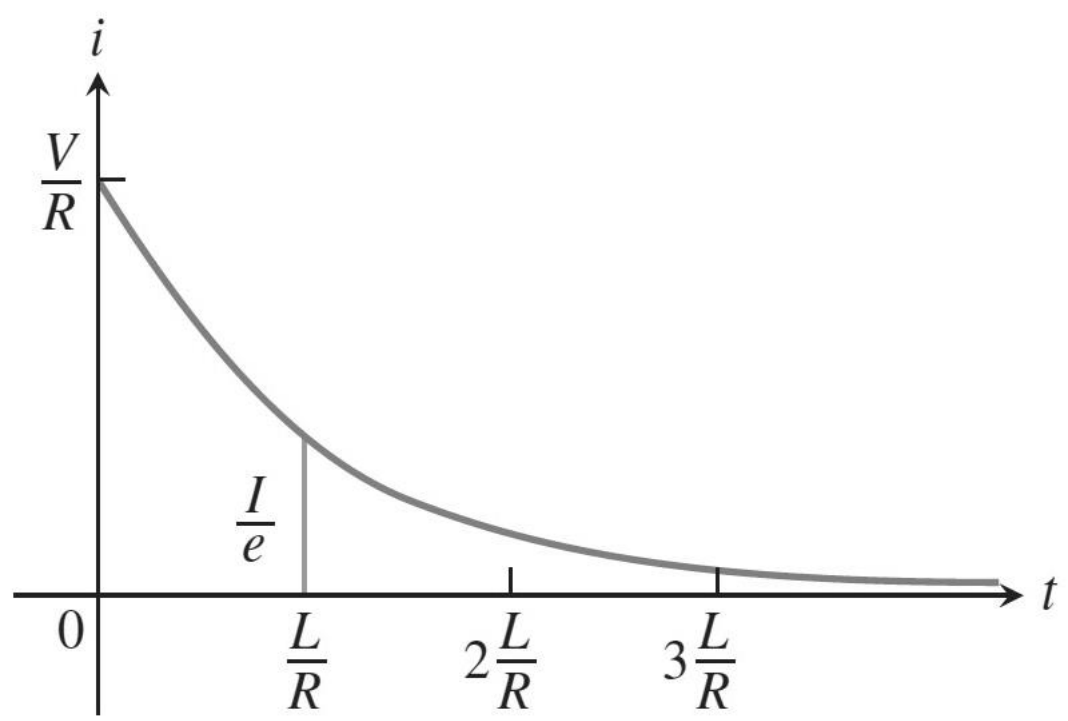
which is Equation (5) with V=0.

Solve the equation to express I as a function of t

How long after the switch is thrown will it take the current to fall to half its original value?

Show that the value of the current when t=L/R is I/e.

Question 3



Question 4

a. If repetitions are not allowed, how many 5-digit numbers can be formed from the digits 1, 2, 3, 4, 5? If repetitions are allowed, what would be the results?

b. In how many ways can 5 gentlemen and 5 ladies sit down at a round table so that no two ladies may be together?

c. In how many ways can a committee of 3 women and 4 men are chosen form 8 women and 7 men? What is the number of ways if Miss X refuses to serve if Mr. Y is a member?

References

Thomas Calculus Early Transcedentals 12th Edition