

3. (a)(4 points) Evaluate the definite integral $I = \int_1^4 \frac{\log_e x}{x} dx$.

4. Let \sqrt{a} be a solution to the equation $x^2 = a$. To approximate \sqrt{a} , we generate a sequence $\{x_n\}_{n=0}^{\infty}$ by using the Newton's method with an initial approximate x_0 .

(a)(4 points) Find a relation $x_{n+1} = g(x_n)$ between x_{n+1} and x_n .

(b)(3 points) By using the Trapezoidal Rule with $n = 3$, approximate the integral $I = \int_1^4 \frac{\log_e x}{x} dx$. (You do not need to simplify it)

(b)(2 points) Find updated x_1 with initial approximation $x_0 = 1$ to estimate $\sqrt{3}$.

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	Student ID		Name			
5. (a) (4 points) Determine whether the improper integral $\int_1^{\infty} \frac{x^3}{1+x^5} dx$ converges or diverges by using the comparison theorem.	(b) (4 points) Determine the conditions on real numbers a and b for the improper integral $\int_1^{\infty} \frac{x^b}{1+x^a} dx$ being convergent.					

6. (5 points) Evaluate $\int_{-\pi}^{\pi} \sin(mx) \sin(nx) dx$ when m and n are integers such that $m \neq n$.