

Question 1:

(a)[3] Suppose $f(x) = 2 - \int_2^{x^2+1} \frac{9}{1+t} dt$. Determine $f(1) - f'(1)$.

(b)[3] Suppose you are using the definition of the definite integral (as a limit of Riemann sums) to evaluate $\int_0^\pi \sin(2x) dx$. Set up BUT DO NOT EVALUATE the expression for the limit of the Riemann sums. Use subintervals of equal length to determine Δx and right endpoints of the subintervals to determine the x_i .

(c)[4] If an animal's mass $w(t)$ is increasing at a rate of $w'(t) = t/(t^2 + 1)$ kilograms per year, what is the total mass gain over the next two years? (Assume that $t = 0$ corresponds to the present.)

Question 2:

(a)[4] Evaluate $\int_0^1 t^3(1+t^4)^3 dt$.

(b)[3] Determine $\int \frac{e^{\tan x}}{\cos^2 x} dx$.

(c)[3] Determine $\int \frac{\sqrt{1+\ln x}}{2x} dx$.

Question 3:

(a)[7] Evaluate $\int_0^{\pi} (x^2 + 1) \cos x \, dx$.

(b)[3] Determine $\int \sin^2(\pi x) \, dx$.

Question 4 [10 points]: Determine $\int \frac{\sqrt{9-x^2}}{x^2} dx$.

Question 5 [10 points]: Determine $\int \frac{x+3}{x(x^2-1)} dx$.