

Problem 1 Evaluate the integrals using the suggested u -substitution.

(a) $\int e^{-x} dx$, $u = -x$

(c) $\int \frac{dt}{(1-6t)^4}$, $u = 1 - 6t$

(b) $\int x^3(2 + x^4)^5 dx$, $u = 2 + x^4$

(d) $\int \frac{\sec^2(1/x)}{x^2} dx$, $u = 1/x$

Problem 2 Evaluate the integral using u -substitution (show work).

(a) $\int x \sin(x^2) dx$

(e) $\int \frac{dx}{5-3x}$

(b) $\int x^2 e^{x^3} dx$

(f) $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

(c) $\int (1 - 3x)^{10} dx$

(g) $\int \cos^4 \theta \sin \theta d\theta$

(d) $\int (x + 1)\sqrt{2x + x^2} dx$

(h) $\int e^{\cos t} \sin t dt$

Problem 3 Evaluate the definite integral.

(a) $\int_0^1 \cos(\pi t/2) dt$

(d) $\int_0^{\pi/2} \cos(x) \sin(\sin(x)) dx$

(b) $\int_0^\pi \sec^2(t/4) dt$

(e) $\int_0^a x\sqrt{a^2 - x^2} dx$

(c) $\int_0^1 x e^{-x^2} dx$

(f) $\int_0^{1/2} \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$

Problem 4 Sketch the region enclosed by the curves and find its area.

(a) $y = x^2, y = 4x - x^2$

(b) $y = \sqrt{x}, y = \frac{1}{2}x, x = 9$

(c) $y = \frac{1}{4}x^2, y = 2x^2, x + y = 3, x + y = 3, x \geq 0$