Let $G(x) = \int_0^x f(t)\,dt$, where $f$ is the function whose graph is shown on the right.

(a) Evaluate $G$ at the following values: $x = 0, 2, 5, 6, 8, 9, 10$.

(b) Find all critical points, all local maxima or minima, and all inflection points.

(c) Sketch the graph of $G(x)$.

Set up Riemann sums with $n = 5$ that estimate $\int_1^3 (x + 2)(4 - x)\,dx$ by using

(a) the left endpoints as sample points, (b) the right endpoints as sample points, (c) the midpoints as sample points. (d) Draw a picture showing the areas of the Riemann sums and the area of the definite integral.

Evaluate each of the indefinite integrals shown below. Be sure to show all your work and indicate the methods used.

(a) $\int \arctan(\pi x)\,dx$ (b) $\int \frac{x + 1}{x^2 - 2x + 2}\,dx$ (c) $\int e^x \sin(e^x - 1)\,dx$ (d) $\int x(\ln x)^2\,dx$.

Use the fundamental theorem of calculus to evaluate the definite integrals shown below. Be sure to show all your work and indicate the methods used.

(a) $\int_{-1}^1 x^2 \sin(\pi x)\,dx$ (b) $\int_1^e \frac{\ln x}{x^2}\,dx$ (c) $\int_0^\pi \cos^3(x)\,dx$ (c) $\int_0^1 (x - 1)\sqrt{x + 1}\,dx$.

Differentiate the function $F(x) = \int_1^{x^2} \frac{\cos t}{t^2}\,dt$.

Use the fundamental theorem of calculus to find the antiderivative $F$ of $f(x) = \frac{\sin x}{x}$ that satisfies $F(1) = 0$.

Simplify the following expressions: (a) $\frac{d}{dx} \left( \int_0^x e^{-t^2}\,dt \right)$ (b) $\int_0^x \left( \frac{d}{dt} e^{-t^2} \right)\,dt$.

Evaluate each of the indefinite integrals shown below. Be sure to show all your work and indicate the methods used.

(a) $\int e^x \cos x\,dx$ (b) $\int \frac{x}{x^2 + 4x + 5}\,dx$ (c) $\int x^3 e^{-x^2}\,dx$ (d) $\int \arcsin x\,dx$.

Use the fundamental theorem of calculus to evaluate the definite integrals shown below. Be sure to show all your work and indicate the methods used.

(a) $\int_{-1}^1 x \cos(x^2 + 1)\,dx$ (b) $\int_1^e x^2 \ln x\,dx$ (c) $\int_0^1 x \sin(\pi x)\,dx$ (c) $\int_0^1 \frac{x}{\sqrt{x} + 1}\,dx$. 