Assignment 10 (10/17)

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Problem 1

Let

$$F(x) = \int_0^x x^2 \sin t \, dt$$

Find $F'(\pi/4)$.

Problem 2

Assume that f is a continuous function such that

$$\int_0^x f(t) \cos^2\left(t^2\right) dt = 6x^2 + 8\cos\left(x^2\right) - \sin\left(2x^2\right).$$

(a) What is $f(\sqrt{\pi})$?

(b) What is the area bounded by the curve $y = f(x)$ and the x-axis with $x \in [0, \sqrt{\pi}]$?

Problem 3

Evaluate

$$\lim_{n\to\infty} \frac{1}{\sqrt{n}} \sum_{i=0}^{n-1} \frac{1}{\sqrt{i}}$$

Problem 4

Let

$$F(x) = \int_3^x \frac{2t - 3F'(t)}{x} dt$$

Evaluate $F'(3)$.

Problem 5

Problems 5.7.$(16, 18, 31, 35, 45, 49, 60)$.

Problem 6

Integrate the following functions.

$$\sin^3 x, \qquad \frac{\sin^3 x}{\cos^2 x}$$