AP Calculus AB — Homework 0317 — Name:

Dr. Paul L. Bailey — Monday, March 17, 2025

Due Tuesday, March 18, 2025.

Problem 1 (Thomas Problem §8.1 # 5)**.** Integrate (substitution)

$$\int_0^1 \frac{16x}{8x^2+2}\,dx.$$

Problem 2 (Thomas Problem §8.1 # 33)**.** Integrate (substitution)

$$\int \frac{dx}{e^x+e^{-x}}.$$

Problem 3 (Thomas Problem §8.1 # 37)**.** Integrate (complete the square)

$$\int_1^2 \frac{8\,dx}{x^2-2x+2}.$$

Problem 4 (Thomas Problem §8.1 # 43)**.** Integrate (trig id)

$$\int (\sec x+\cot x)^2\,dx.$$

Problem 5 (Thomas Problem §8.1 # 51)**.** Integrate (improper fractions)

$$\int \frac{4t^3-t^2+16t}{t^2+4}\,dt.$$

Problem 6 (Thomas Problem §8.1 # 57)**.** Integrate (jail trick)

$$\int \frac{1}{1+\sin x}\,dx.$$

Problem 7 (Thomas Problem §8.1 # 65)**.** Integrate (eliminating radicals)

$$\int_{\pi/2}^{\pi} \sqrt{1+\cos(2t)}\, dt.$$

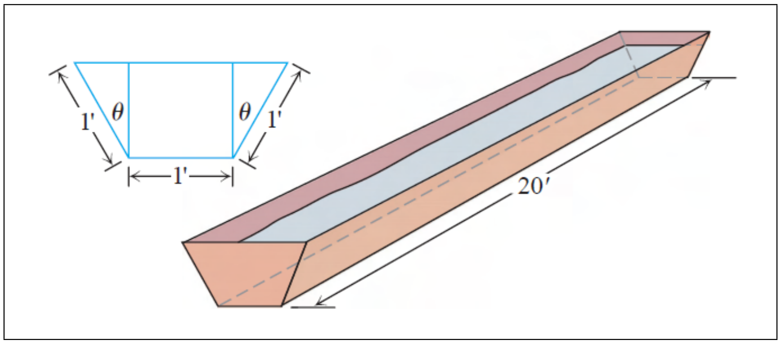
Problem 8. The *change of base* formula for logarithms is $\log_b x = \dfrac{\log_a x}{\log_a b}$. Use this to compute $\dfrac{d}{dx} \log_{10} x$.

Problem 9. Let $f : \mathbb{R} \to \mathbb{R}$ be twice differentiable such that

$$f'(x) = x^4 + 4x^3 - 8x^2 - 48x + 7.$$

Find the points of inflection of f.

Problem 10 (Thomas Problem §4.5 # 24)**.** The trough in the figure is to be made to the dimensions shown. Only the angle θ can be varied.



What value of θ will maximize the trough's volume?