

Name (print): _____ Signature: _____

You have 30 minutes. Show your work. Notes, calculators not allowed! Problems are on both pages.

Problem 1. (3 pts) Find the indefinite integral:

$$\int \cos(2x) + 5x \, dx$$

Problem 2. (4 pts) Find the antiderivative $F(x)$ of the function $f(x) = \sqrt{x} - 6$ such that $F(1) = 5$.

Problem 3. (4 pts) Write down the right-endpoint Riemann sum for $f(x) = \sin x - x$ on the interval $[0, 1]$ with $n = 3$ subintervals. Is this Riemann sum an overestimate of $\int_0^1 f(x) \, dx$ or an underestimate of $\int_0^1 f(x) \, dx$? Explain.

Problem 4. (4 pts) Find $\int_{-3}^7 f(x) dx$ where $f(x) = \begin{cases} \sqrt{9-x^2} & \text{if } x < 0 \\ x+3 & \text{if } x \geq 0 \end{cases}$.

Problem 5. (4 pts) Find b so that the average value of $f(x) = x - 4$ on the interval $[1, b]$ is 3.

Problem 6. (3 pts) Find the indefinite integral:

$$\int x(x-1)^{17} dx$$