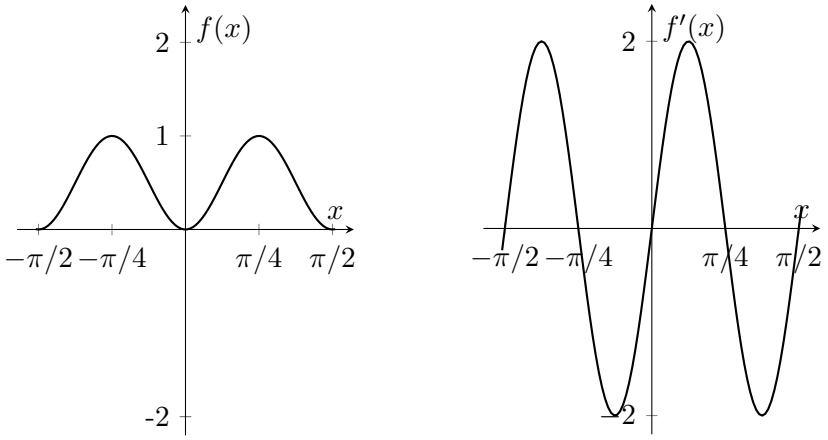
7. [8 points] Consider the function $f(x) = \sin^2(2x)$. The graph of f and f' are shown below.



Determine whether the following approximations of integrals of $f(x)$ are overestimates or underestimates. Clearly write the entire word, either OVERESTIMATE or UNDERESTIMATE. If it cannot be determined whether the estimate is an over- or underestimate using the methods of the course, write CANNOT DETERMINE. You do not need to show your work.

a. [2 points] LEFT(4) of $\displaystyle\int_0^{\pi/4} f(x)dx$.

OVERESTIMATE **UNDERESTIMATE** CANNOT DETERMINE

b. [2 points] RIGHT(4) of $\displaystyle\int_{\pi/4}^{\pi/3} f(x)dx$.

OVERESTIMATE **UNDERESTIMATE** CANNOT DETERMINE

c. [2 points] TRAP(4) of $\displaystyle\int_{-\pi/8}^{\pi/8} f(x)dx$.

OVERESTIMATE UNDERESTIMATE CANNOT DETERMINE

d. [2 points] MID(4) of $\displaystyle\int_0^{\pi/12} f(x)dx$.

OVERESTIMATE **UNDERESTIMATE** CANNOT DETERMINE