

MATH 30: INTEGRATION WORKSHEET (CORONAVIRUS EDITION)

(Please write your work and answers on another piece of paper.)

- (1) Calculate the integral $\int_0^3 (6 - 3x) dx$, in two different ways:
- (a) Sketch the graph of $g(x) = 6 - 3x$ and find areas of triangles.
 - (b) Find an antiderivative of g and use the Fundamental Theorem of Calculus, Part II.
- (2) Find the average value of the function $f(x) = \cos x$ over the interval $[0, \frac{\pi}{2}]$. Make a sketch illustrating your answer.
(Remember: the average is “the height of the rectangle having the same area.”)
- (3) Consider the function $f(x) = \int_0^{x^2} e^t dt$. Find the derivative $f'(x)$, in two different ways:
- (a) Use the Chain Rule and the Fundamental Theorem of Calculus, Part I.
 - (b) Use the Fundamental Theorem of Calculus, Part II, then differentiate.
- (4) Find an expression of the form $\sum_{j=1}^n f(x_j) \Delta x$ that represents the approximate area under the curve $y = \sin x$ between $x = 0$ and $x = \pi$, using 100 rectangles of equal width and using “right endpoints.” Make a sketch illustrating your answer.