Roll# Student 1: ----------------------   Roll# Evaluator 1: ----------------------

Roll# Student 2: ----------------------   Roll# Evaluator 2: ----------------------

Problem 1 [10 Marks]

Find the most general antiderivative of the function.

a) $f(x) = \sqrt{2}$ 　　　　　　[3 Marks]

b) $f(t) = \dfrac{3t^4 - t^3 + 6t^2}{t^4}$ 　　[4 Marks]

c) $f(t) = 2\sin t - \sec^2 t$ 　　[3 Marks]

Problem 2 [10 Marks]

Find f.

a) $f'(t) = t + \dfrac{1}{t^3}, \ t > 0, \ f(-1) = 2$ 　　　　　　[5 Marks]

b) $f'''(x) = \cos x, \ f(0) = 1, \ f'(0) = 2, \ f''(0) = 3$ 　　　[5 Marks]

Problem 3 [20 Marks]

a) By reading values from the given graph of f, use **four** rectangles to find a lower estimate and an upper estimate for the area under the given graph of f from $x = 0$ to $x = 8$. In each case sketch the rectangles that you use. 　　　　　　[10 Marks]
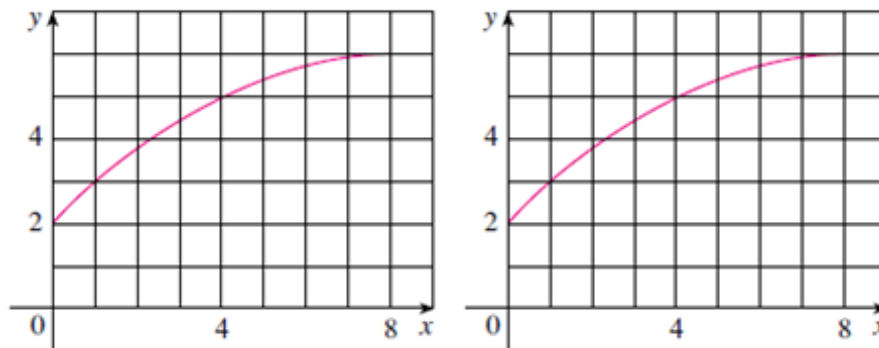

Figure 1: Graph 1

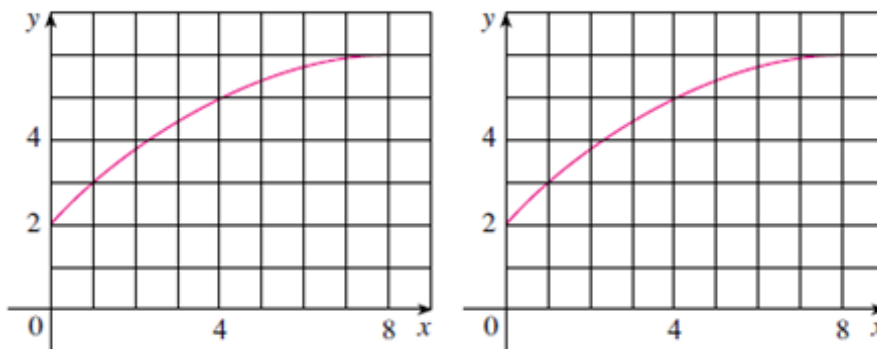b) Find new estimates using **eight** rectangles in each case. [10 Marks]

Figure 2: Graph 1

Problem 4 [20 Marks]

The velocity graph of a braking car is shown. Use it to estimate the distance traveled by the car while the brakes are applied. In this case $distance = \int_0^6 v(t) \, dt$. Estimate this integral using approximate rectangles of your choice.
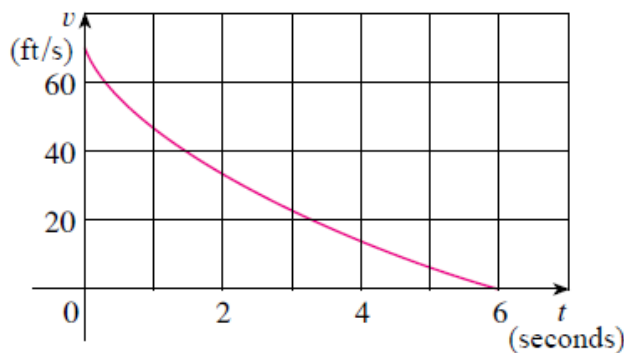

Figure 3: Graph 2

Problem 5 [20 Marks]

a) If $f(x) = x^2 - 2x, 0 \le x \le 3$, evaluate the Riemann sum with $n = 6$, taking the sample points to be right endpoints. Is this a lower estimate or an upper estimate? Illustrate with a diagram.

b) Evaluate $\int_0^3 f(x) \, dx$,