

Name (print) \_\_\_\_\_ Discussion hour (T Th \_\_\_)

1. (10 pts.) Find the average value of  $y = f(x) = x^2 + x$  on the interval  $[-1, 2]$ .

**Solution:** Let  $F(x) = \frac{x^3}{3} + \frac{x^2}{2}$  (**3 points**). Since  $F'(x) = x^2 + x$ , the average value is

$$\frac{1}{2 - (-1)} \int_{-1}^2 (x^2 + x) dx = \frac{F(2) - F(-1)}{3} = \frac{(\frac{8}{3} + 2) - (-\frac{1}{3} + \frac{1}{2})}{3} = \frac{3}{2} \text{ (7 points).}$$

2. (10 pts.) An object is moving along a straight line with velocity  $v(t) = 2t + 3$  feet per second. Find the distance that it travels from  $t = 2$  to  $t = 3$  seconds.

**Solution:** Let  $F(t) = t^2 + 3t$  (**3 points**). Since  $F'(t) = 2t + 3 = v(t)$ , the distance the objects travels is

$$\int_2^3 (2t + 3) dt = F(3) - F(2) = 18 - 10 = 8 \text{ feet (7 points).}$$

Name (print) \_\_\_\_\_ Discussion hour (T Th \_\_\_\_)

1. (10 pts.) Find the average value of  $y = f(x) = x^2 - x$  on the interval  $[-3, 1]$ .

**Solution:** Let  $F(x) = \frac{x^3}{3} - \frac{x^2}{2}$  (**3 points**). Since  $F'(x) = x^2 - x$ , the average value is

$$\frac{1}{1 - (-3)} \int_{-3}^1 (x^2 - x) dx = \frac{F(1) - F(-3)}{4} = \frac{(\frac{1}{3} - \frac{1}{2}) - (-\frac{27}{3} - \frac{9}{2})}{4} = \frac{10}{3} \text{ (**7 points**)}.$$

2. (10 pts.) An object is moving along a straight line with velocity  $v(t) = 4t + 5$  feet per second. Find the distance that it travels from  $t = 1$  to  $t = 3$  seconds.

**Solution:** Let  $F(t) = 2t^2 + 5t$  (**3 points**). Since  $F'(t) = 4t + 5 = v(t)$ , the distance the objects travels is

$$\int_1^3 (4t + 5) dt = F(3) - F(1) = 33 - 7 = 26 \text{ feet (**7 points**)}.$$