

Review Problems 1

1. Two cars start driving at $t = 0$ with velocities $v_1(t) = 2t + 4$ and $v_2(t) = 4t + 1$ meter/sec. in the same direction.
 - (a) How long does it take for car 1 to drive 60 meters?
 - (b) When do the cars meet?

2. #35, p. 256.

3. Find the area of the region below $y = -x^2 - 2x + 6$ and above $y = x^2 + 2x$.

4. A particle is moving with velocity

$$v(t) = \frac{e^{-2t^2}}{t+1}, \quad t \geq 0.$$

- (a) Using Riemann sums with 4 subdivisions, find lower and upper estimates for the distance traveled by the particle for the first 2 sec.
 - (b) Is the total distance traveled by the particle finite or infinite?
5. #61, p. 286.
6. The average income in US increases with the rate

$$r(t) = t \cdot 2^t \text{ \$/year,}$$

where t is the time in years since 1980. The average income in 1980 was \$30,000.

- (a) What is the average income in 1990? (You should be able to do this without using integral function on your calculator.)
 - (b) What is the average of the average income over the period 1980–1990?
7. Let $f(x) = \frac{x+1}{x-2}$. Order the following quantities from smallest to largest:

$$\int_4^5 f(x)dx, \text{ LEFT}(20), \text{ RIGHT}(20), \text{ LEFT}(10), \text{ TRAP}(20), \text{ MID}(20).$$

8. Are the following integrals converge or diverge?

$$\int_1^\infty \frac{1}{x^2 \ln x} dx, \quad \int_0^\infty x e^{-x^2} dx, \quad \int_2^\infty \frac{x \sin x}{2x^3 + x - 1} dx, \quad \int_1^3 \frac{dx}{x \ln x}, \quad \int_0^\infty \frac{\sqrt{x^3}}{x^2 + 1} dx$$

9. It is estimated that freon escapes in the earth atmosphere with the rate $r(t) = \frac{100e^t}{1+e^{2t}}$ gal./year, where t is the year after 2000. What is the total amount of freon that will escape in the earth atmosphere after 2000?