

Review sheet for sections 4.7, 5.1, 5.2, 5.3, 5.4, 5.5 of the book

This review sheet covers only the sections that did not appear on the review sheets for the first and second exams. The final exam covers the entire semester. You should study all three review sheets. Of course, you should be able to do all of the suggested homework problems for the entire course.

(1) It costs $C(x) = 5 + 20x + x^2/100$ dollars to produce x pounds of some commodity. Find the value of x that minimizes the average cost $C(x)/x$.

(2) It costs $C(x) = x^4 - 3x^2 + 10x + 50$ dollars to produce x gallons of detergent. Find the value of x that minimizes the marginal cost $C'(x)$.

(3) If p dollars are charged for each ton of paint, then $x = 1000 - p$ tons will be sold. It costs $C(x) = 500x + x^2$ dollars to manufacture these x tons of paint. Find the values of x and p that maximize profit.

(4) Find the function $f(x)$ which has all of the following properties: $f''(x) = \cos(2x)$, $f(0) = 3$, $f'(0) = 5$.

(5) Find the function $f(x)$ which has both of these properties: $\frac{d}{dx}f(x) = \frac{d}{dx}\sqrt{1+x^4}$, $f(0) = 2$.

(6) Find $\int \frac{x}{x^2 + 10} dx$.

(7) Find $\int (x+3)(x^3+1) dx$.

(8) Find $\int_2^3 (5+e^x)(3+e^x) dx$.

(9) Find $\int_1^3 \frac{5+4x}{\sqrt{x}} dx$.

(10) Find $\int_0^{\pi/2} (\cos x)(\sin^7 x) dx$ and $\int x \sin(x^2) dx$.

(11) Find the area between the curve $y = 2 - x^4$ and the x -axis.

(12) Assume that $f(x)$ is a continuous function on $[3, 10]$ with the following properties: $\int_3^9 f(x) dx = 5$, $\int_5^9 f(x) dx = 8$ and $\int_5^{10} f(x) dx = 2$. Find $\int_3^5 f(x) dx$, $\int_9^{10} f(x) dx$ and $\int_3^{10} f(x) dx$.

(13) Find the Riemann sum associated with $f(x) = x^3$, the partition of the interval $[2, 5]$ into 6 subintervals of equal width, and the choice x_k^* = the midpoint of the k th subinterval.

(14) Find the Riemann sum associated with $f(x) = x^2 + 4$, the partition $x_0 = 2$, $x_1 = 3$, $x_2 = 7$, $x_3 = 9$ of the interval $[2, 9]$ and the choice x_k^* = the left endpoint of the k th subinterval.