Practice Assignment 1

In this first practice assignment, you will review topics from sections 5.1, 5.2, 5.3, 5.4 and 8.5 (partial).
Try all problems for practice.
If you have difficulties, ask for help in class or in the instructor's office; all answers are shown in another file.

(1) $\displaystyle\int \frac{5x \cos x + 14 - 2\sqrt{x} + 3x\,e^x}{7x}\,dx$

(2) $\displaystyle\int \frac{2\sqrt[4]{x} - 5\sqrt{x} + 4x^3}{\sqrt[3]{x}}\,dx$

(3) $\displaystyle\int \frac{6\sqrt{x} - 5x^2 + 3\sqrt[3]{x}\,\sec^2 x}{30\sqrt[3]{x}}\,dx$

(4) $\displaystyle\int \left(4\sqrt{x} - 3x^3\right)^2\,dx$

(5) $\displaystyle\int \frac{\left(5x + 3\sqrt{x}\right)^2}{x^2}\,dx$

(6) $\displaystyle\int \frac{\sqrt[5]{x} + x^3\,e^x + 6x^5 - 2x^3\,\csc^2 x}{3x^3}\,dx$

(7) $\displaystyle\int \frac{6\sqrt[5]{x^2} + 3\sqrt[3]{x^4} - 8x^4}{2\sqrt{x}}\,dx$

(8) $\displaystyle\int \frac{9x^5 - 12\sqrt[3]{x}}{30\sqrt{x^5}}\,dx$

(9) $\displaystyle\int \left(8\sqrt[4]{x} + 2x^2\right)^2\,dx$

(10) $\displaystyle\int \frac{\left(3x^2 - \sqrt[3]{x}\right)^2}{3x^2}\,dx$

(11) $\displaystyle\int \frac{3}{x\,(\ln x)^4}\,dx$

(12) $\displaystyle\int \frac{4\,e^{3x}}{4 + e^{3x}}\,dx$

(13) $\displaystyle\int \frac{8x}{x^2 + 4}\,dx$

(14) $\displaystyle\int \sqrt{3x^2 + 6x}\,(x + 1)\,dx$

(15) $\displaystyle\int \frac{8x}{(x^2 + 2)^3}\,dx$

(16) $\displaystyle\int \frac{3}{x\,(\ln x + 4)^4}\,dx$

(17) $\displaystyle\int 9x^2\,\csc^2\left(x^3 + 1\right)\,dx$

(18) $\displaystyle\int \frac{x - 3}{5 - 6x + x^2}\,dx$

(19) $\displaystyle\int \frac{\sqrt[3]{3 + \ln x}}{x}\,dx$

(20) $\displaystyle\int \cos x\,(2 - \sin x)^4\,dx$

(21) $\displaystyle\int \frac{\sec^2 x}{1 + 2\tan x}\,dx$

(22) $\displaystyle\int \frac{x + 4}{\sqrt[4]{x^2 + 8x}}\,dx$

(23) $\displaystyle\int 9x^2\,\sqrt{x^3 + 1}\,dx$

(24) $\displaystyle\int \frac{e^{2x} + x}{\sqrt{e^{2x} + x^2}}\,dx$

(25) $\displaystyle\int \frac{(2 + 3\ln x)^5}{x}\,dx$

(26) $\displaystyle\int \frac{t + 1}{t^2 + 2t + 3}\,dt$

(27) Given $f''(x) = 30x^4 + 12x$; $f'(0) = 5$; $f(0) = -7$, find $f(x)$

(28) Given $f''(x) = 24x^2 - 18x$; $f'(-1) = 2$; $f(1) = 4$, find $f(x)$

(29) Given $f''(x) = 60\sqrt{x} - 48x$; $f'(1) = 25$; $f(4) = 30$, find $f(x)$

(30) Given $f''(x) = 2\sin x + 12x$; $f'(0) = 5$; $f(0) = 3$, find $f(x)$

(31) $\displaystyle\int \frac{6x^3\,e^{2x}-5x^2}{x^3}\,dx$ (32) $\displaystyle\int \left(3x^{-1}+4\right)^2\,dx$ (33) $\displaystyle\int \sqrt[3]{x}\,\left(3x-2\sqrt{x}+6\right)\,dx$

(34) $\displaystyle\int \frac{6x\,e^{3x}-18+5x^4+3x\,\cos 2x}{3x}\,dx$ (35) $\displaystyle\int \frac{8x^2\,e^{-x}+24x+20}{4x^2}\,dx$

(36) $\displaystyle\int \frac{4x^{1/2}\,e^{2x}+3x^3-6}{\sqrt{x}}\,dx$ (37) $\displaystyle\int \frac{x^{2/3}+3x^2\,e^{3x}-5+4x^2\,\csc^2 2x}{x^2}\,dx$

(38) $\displaystyle\int \left(2x^2+9\right)^2\,dx$ (39) $\displaystyle\int \left(3\sqrt{x}+4x\right)^2\,dx$ (40) $\displaystyle\int \left[\,4x-\sqrt[3]{x}\,\left(2x-5x^2\right)\,\right]\,dx$

(41) $\displaystyle\int_1^4 \left(\frac{2}{x\sqrt{x}}-5\sqrt{x}\right)\,dx$ (42) $\displaystyle\int_1^8 \left(6\sqrt[3]{x}-\frac{8}{\sqrt[3]{x^2}}\right)\,dx$ (43) $\displaystyle\int_{-1}^0 \sqrt[3]{x}\,\left(3-x^2\right)\,dx$

(44) $\displaystyle\int_{\sqrt{22}}^{\sqrt{3}} \frac{x\,dx}{\sqrt[3]{x^2+5}}$ (45) $\displaystyle\int_0^4 \frac{e^{\sqrt{t}}}{\sqrt{t}}\,dt$ (46) $\displaystyle\int_0^7 \sqrt{9+x}\,dx$

(47) Sketch the region and find the area of the region bounded by $x=-2$, $x=3$, $f(x)=-x^2+4$, $y=0$

(48) Sketch the region and find the area of the region bounded by $x=-3$, $x=1$, $f(x)=x^3+1$, $y=0$

(49) Find the cost function given $\displaystyle\frac{dC}{dx}=5x-\frac{1}{x}$ and 10 units cost \$94.20

(50) Find the cost function given $\displaystyle\frac{dC}{dx}=\frac{1}{x}+2x$ and 7 units cost \$58.40

(51) Sketch the region and find the area of the region bounded by $y=x^5-x$, $y=0$, $0\le x\le 2$

(52) Sketch the region and find the area of the region bounded by $y=x^4-x^3$, $y=0$, $0\le x\le 2$

(53) Sketch the region and find the area of the region bounded by $y=x^3+x^2$, $y=0$, $-1\le x\le 2$

(54) Sketch the region and find the area of the region bounded by $y=x^4+x$, $y=0$, $-1\le x\le 2$

(55) Sketch the region and find the area of the region bounded by $y=-x^2-x$, $y=0$, $-1\le x\le 2$

(56) $\displaystyle\int_{-8}^1 x^3\left(4-\sqrt[3]{x}\right)\,dx$ (57) $\displaystyle\int_1^2 \frac{x+1}{\sqrt{x^2+2x}}\,dx$ (58) $\displaystyle\int_0^1 (x-1)\,e^{x^2-2x}\,dx$

(59) $\displaystyle\int_1^2 \frac{6+x^6}{x^2}\,dx$ (60) $\displaystyle\int_1^3 \frac{x^2}{1+x^3}\,dx$ (61) $\displaystyle\int_0^1 \frac{6x}{(1+x^2)^3}\,dx$

(62) Sketch the region and find the area of the region bounded by $y=x^2+2$, $y=0$, $-1\le x\le 0$

(63) Sketch the region and find the area of the region bounded by $y=4-x^2$, $y=0$, $-3\le x\le 1$

(64) Find the demand function at $x = 90$ given $\dfrac{dR}{dx} = x^2 - 2x + 3$

(65) Find the profit function at $x = 100$ given $\dfrac{dP}{dx} = 2x + 20$ and profit on 0 items is $-\$50$

(66) Sketch the region and find the area of the region bounded by $y = x^3 - x^2 + x - 1$, $y = 0$, $0 \le x \le 2$

(67) Sketch the region and find the area of the region bounded by $y = x^3 + x^2 + x + 1$, $y = 0$, $-3 \le x \le 1$

(68) Sketch the region and find the area of the region bounded by $y = x^3 + x^2 - 2x$, $y = 0$, $-2 \le x \le 1$

(69) Sketch the region and find the area of the region bounded by $y = x^3 + 2x$, $y = 0$, $-1 \le x \le 2$

(70) Sketch the region and find the area of the region bounded by $y = x^3 - x^2$, $y = 0$, $-1 \le x \le 1$

(71) Suppose $f''(x) = 6x + 2$ and the point $(-1, 3)$ is on the graph of $f(x)$ where the slope of the tangent line is 2 . Find $f(x)$.

(72) Find the equation of the curve that passes through $(1, 3)$ if its slope is given by $\dfrac{dy}{dx} = 12x^2 - 12x$ for each x .

(73) Given $\dfrac{dy}{dt} = \dfrac{\sqrt{t^3} - t}{\sqrt{t^3}}$, find the function y that satisfies the condition $y(9) = 4$

(74) Given $\dfrac{dy}{dx} = 2x^{-2} + 3x^{-1} - 1$, find the function y that satisfies the condition $y(1) = 0$

(75) Given $f''(x) = 18x - 6x^2$, find the function $f(x)$ that satisfies the following conditions $f'(1) = 20$ $f(1) = 15$

(76) Suppose $f''(x) = 14 - 12x$ and the point $(2, 3)$ is on the graph of $f(x)$ where the slope of the tangent line is 5 . Find $f(x)$.

(77) Find the equation of the curve that passes through $(-1, 20)$ if its slope is given by $\dfrac{dy}{dx} = 48x - 6x^2$ for each x .

(78) Given $\dfrac{dy}{dt} = \dfrac{\sqrt[3]{t^2} - 4}{\sqrt[3]{t^2}}$, find the function y that satisfies the condition $y(-8) = 4$

(79) Given $\dfrac{dy}{dx} = 4x^{-3} + 5x^{-1} + 3$, find the function y that satisfies the condition $y(1) = 3$

(80) Given $f''(x) = 12x^2 - 6x$, find the function $f(x)$ that satisfies the following conditions $f'(-1) = 8$ $f(-1) = 5$

(81) Given $f'(x) = 8x - 4\,e^{2x} + 5\,\sin x$, find the function $f(x)$ that satisfies the condition $f(0) = 4$

(82) Determine $\displaystyle \int \dfrac{(3 + 5x)(x^2 + 1)^2}{2x}\, dx$ (83) Determine $\displaystyle \int \dfrac{3\sqrt{x} - 4x^2\, e^{3x} + 2x^2\, \sin(4x)}{3x^2}\, dx$

(84) Find the value(s) of k such that $\displaystyle \int_1^2 \left[2k^2\, x - 3x^2 \right] dx = 20$

(85) Find the value(s) of k such that $\displaystyle \int_{-1}^0 \left[5k + 3k^2\, x^2 \right] dx = 6$

(86) Determine $\int \left[\frac{1}{3} \left(2^{3x} \right) - 4\,e^{-2x} + \frac{4}{3x+1} - 2\,\sec^2(3x) \right]\,dx$ (87) Determine $\int \frac{20x^2 - 27x + 11}{4x - 3}\,dx$

(88) Determine $\int \frac{x^3 + 5x}{x^2 + 1}\,dx$

(89) Find the area of the region bounded by $f(x) = x^3 - 1$, the $x-$axis from $x = 0$ to $x = 2$

(90) If $\int_2^5 f(x)\,dx = 6$ and $\int_3^5 f(x)\,dx = 4$; evaluate $\int_2^3 f(x)\,dx$

(91) Determine $\int \frac{2x\,\cos(2x) - (4x - 1)(3 + x)}{3x}\,dx$

(92) Given $f'(x) = 6\,e^{3x} - 4\,\sin(2x)$, find the function $f(x)$ that satisfies the following condition $f(0) = 3$

(93) If $\int_{-1}^4 f(x)\,dx = 4$ and $\int_{-1}^4 g(x)\,dx = 6$; evaluate $\int_{-1}^4 \left[3\,f(x) - 2\,g(x) + 3 \right]\,dx$

(94) Find the area of the region bounded by $f(x) = 3x^2 - 6x$, the $x-$axis from $x = -1$ to $x = 1$

(95) Find the average cost function given $MC = 0.3x^2 + 6x + 100$ and at 10 units the cost is $3000

(96) Find the demand function given $MR = 9x^2 + 0.1x + 500$ and at 10 units the revenue is $8500

(97) Find the cost function given $MC = 12x^2 + 20\,e^{2x}$ and the fixed costs are $1000

(98) Find the demand function at $x = 16$ units given $MR = 6\sqrt{x} + 8x + 500$

(99) Evaluate $\int_0^2 \left(x^3 - 3x \right)^3 \left(x^2 - 1 \right)\,dx$ (100) Evaluate $\int_0^1 e^{x^2 - 2x} \left(1 - x \right)\,dx$