6.4 HW p.432-438 #17-33 odd, 39, 53, 71-77 odd

17) $\int_0^1 t^2 - t^{3/2}\,dt \rightarrow \frac{t^3}{3} - \frac{t^{5/2}}{5/2}\Big]_0^1 \rightarrow \frac{1}{3} - \frac{2}{5}(1)^{5/2} - (0-0)$

$\frac{1}{3} - \frac{2}{5} = \frac{5}{15} - \frac{6}{15} = \boxed{\frac{-1}{15}}$

19) $\int_{\pi/2}^{\pi} 4\sin x\,dx \rightarrow -4\cos x\Big]_{\pi/2}^{\pi} \rightarrow -4\cos(\pi) - -4\cos(\pi/2)$

$\rightarrow -4(-1) + 4(0) = \boxed{4}$

21) $\int_{-\pi/4}^{\pi/4} (1 + 2\sec x\tan x)\,dx \rightarrow x + \sec x\Big]_{-\pi/4}^{\pi/4} \rightarrow \frac{\pi}{4} + \sec\pi/4 - \left(-\frac{\pi}{4} + \sec\left(\frac{-\pi}{4}\right)\right)$

$\rightarrow \frac{\pi}{4} + \frac{2}{\sqrt{2}} + \frac{\pi}{4} - \frac{2}{\sqrt{2}} \rightarrow \boxed{\frac{\pi}{2}}$

23) $\int_1^4 \sqrt{x} - 4x\,dx \rightarrow \frac{x^{3/2}}{3/2} - \frac{4x^2}{2} \rightarrow \frac{2}{3}x^{3/2} - 2x^2\Big]_1^4 = \frac{2}{3}(4)^{3/2} - 2(4)^2 - \left(\frac{2}{3} - 2\right)$

$\rightarrow \frac{2}{3}(8) - 32 - \frac{2}{3} + 2 \rightarrow \frac{14}{3} - 30 \rightarrow \frac{14}{3} - \frac{90}{3} = \boxed{-\frac{76}{3}}$

25) $\int_{-2}^{3} (x-1)(x+3)\,dx \rightarrow \int_{-2}^{3} x^2 + 2x - 3\,dx$

$\rightarrow \frac{x^3}{3} + \frac{2x^2}{2} - 3x\Big]_{-2}^{3} = \frac{3^3}{3} + 3^2 - 3(3) - \left(\frac{-8}{3} + 4 + 6\right)$

$\rightarrow 9 + 9 - 9 + \frac{8}{3} - 10 \rightarrow \boxed{\frac{5}{3}}$

27) $\int_1^2 \frac{x^2 - 12}{x^4}\,dx$

$\int \frac{x^2}{x^4} - \frac{12}{x^4}\,dx$

$\int x^{-2} - 12x^{-4}\,dx$

$\frac{x^{-1}}{-1} - \frac{12x^{-3}}{-3}$

$-\frac{1}{x} + \frac{4}{x^3}\Big]_1^2$

$-\frac{1}{2} + \frac{4}{8} - \left(-\frac{1}{1} + \frac{4}{1}\right)$

$-\frac{1}{2} + \frac{1}{2} - 3 = \boxed{-3}$

29) $\int_0^1 \frac{e^{2x}-1}{e^x}dx \to \int_0^1 \frac{e^{2x}}{e^x} - \frac{1}{e^x}dx$

$\int_0^1 e^x - e^{-x}dx \to e^x - (-e^{-x}) \to e^x + e^{-x}\Big]_0^1$

$e^1 + e^{-1} - (e^0 + e^0) = e + \frac{1}{e} - (2) = \boxed{e + \frac{1}{e} - 2}$

31) $\int_{\pi/3}^{\pi/2} \frac{x\sin x + 2}{x}dx \quad \int \frac{x\sin x}{x} + \frac{2}{x}dx$

$\int \sin x + \frac{2}{x}dx \to -\cos x + 2\ln|x|\Big]_{\pi/3}^{\pi/2} = -\cos(\frac{\pi}{2}) + 2\ln|\frac{\pi}{2}| - (-\cos(\frac{\pi}{3}) + 2\ln|\frac{\pi}{3}|$

$= -(0) + 2\ln(\frac{\pi}{2}) + \frac{1}{2} - 2\ln(\pi/3) = \boxed{\frac{1}{2} + 2\ln(\frac{\pi}{2}) - 2\ln(\frac{\pi}{3}) \text{ OR } \frac{1}{2} + 2\ln\left(\frac{\pi/2}{\pi/3}\right) = \frac{1}{2} + 2\ln(3/2)}$

33) $\int_1^2 \frac{x^2+2}{x^2}dx$

$\int \frac{x^2}{x^2} + \frac{2}{x^2}dx \to \int 1 + 2x^{-2}dx \to x + \frac{2x^{-1}}{-1}\Big]_1^2 = 2 - \frac{2}{2} - (1 - \frac{2}{1})$

$= 2 - 1 - 1 + 2 = \boxed{2}$

39) $\int_{-2}^{2} f(x)dx \quad f(x) = \begin{cases} 3x & \text{if } -2 \le x < 0 \\ 2x^2 & \text{if } 0 \le x < 2 \end{cases}$

$\int_{-2}^{0} 3x\,dx + \int_0^2 2x^2dx$

$\frac{3x^2}{2}\Big]_{-2}^{0} + \frac{2x^3}{3}\Big]_0^2$

$\frac{0}{2} - \frac{3(2)^2}{2} + \frac{2(8)}{3} - 0 \to -\frac{12}{2} + \frac{16}{3} = \boxed{-\frac{2}{3}}$

53) $\int_3^{11} f(x)dx - \int_7^{11} f(x)dx = \int_3^{7} f(x)dx$

* since $\int_3^7 f(x)dx + \int_7^{11} f(x)dx = \int_3^{11} f(x)dx$

therefore $\boxed{\int_3^7 f(x)dx = \int_3^{11} f(x)dx - \int_7^{11} f(x)dx}$

Find the Avg. Value of f(x) on given interval

$*f(c) = \frac{1}{b-a}\int_a^b f(x)dx$

71) $f(x) = e^x$ over $[0,1]$ $\quad f(c) = \frac{1}{1-0}\int_0^1 e^x dx \to e^x\Big]_0^1 = e^1 - e^0$

$\boxed{e-1}$

73) $f(x) = x^{2/3}$ over $[-1,1]$

$\frac{1}{1-(-1)}\int_{-1}^{1} x^{2/3}dx \to \frac{x^{5/3}}{5/3} \to \frac{3}{5}x^{5/3}\Big]_{-1}^{1} \to \frac{3}{5}(1) - \frac{3}{5}(-1)^{5/3}$

$\frac{1}{2}\left[\frac{3}{5}+\frac{3}{5}\right] \to \frac{1}{2}\left(\frac{6}{5}\right) = \boxed{\frac{3}{5}}$

75) $f(x) = \sin x \ [0, \pi/2] \to f(c) = \frac{1}{\frac{\pi}{2}-0}\int_0^{\pi/2} \sin x dx \to -\cos x\Big]_0^{\pi/2} = -\cos\left(\frac{\pi}{2}\right) - -\cos(0)$

$\frac{1}{\pi/2}\cdot[0+1] = \boxed{\frac{2}{\pi}}$

77) $f(x) = 1-x^2 \ [-1,1]$

$f(c) = \frac{1}{1-(-1)}\int_{-1}^{1}(1-x^2)dx$

$x - \frac{x^3}{3}\Big]_{-1}^{1} = 1-\frac{1}{3}-\left(-1-\left(\frac{-1}{3}\right)\right)$

$\frac{1}{2}\left[1-\frac{1}{3}+1-\frac{1}{3}\right]$

$\frac{1}{2}\left[2-\frac{2}{3}\right]$

$\frac{1}{2}\left(\frac{4}{3}\right) = \boxed{\frac{2}{3}}$