M1B/Schoenbrun Homework-4

Section 5.4 Page 381 (12,13,14,17,18,23,24,27,35,36,45)

12. $\int_{-\pi/2}^{\pi/2} 4\sin x\,dx = 0$

13. $\int_{-10}^{10} \frac{x}{\sqrt{200-x^2}}\,dx = 0$

14.

$$\int_{-\pi/2}^{\pi/2} \left(\cos 2x + \cos x \sin x - 3\sin x^5\right) dx = \int_{-\pi/2}^{\pi/2} \cos 2x\,dx + \int_{-\pi/2}^{\pi/2} \cos x \sin x\,dx - 3\int_{-\pi/2}^{\pi/2} \sin x^5\,dx =$$

$$2\int_{0}^{\pi/2} \cos 2x\,dx + 0 - 3(0) = 2\left[\frac{\sin 2x}{2}\right]_0^{\pi/2} = \sin\pi - \sin 0 = 0$$

17. $\int_{-\pi}^{\pi} \sin x\,dx = 0$

18. $\int_{0}^{2\pi} \cos x\,dx = 0$

23. $\overline{f} = \frac{\int_{-1}^{1} \frac{1}{1+x^2}\,dx}{1-{}^{-}1} = \frac{[\arctan x]_{-1}^{1}}{2} = \frac{\frac{\pi}{4} - \frac{-3\pi}{4}}{2} = \frac{\pi}{2}$

24. $\overline{f} = \frac{\int_{-\pi/4}^{\pi/4} \cos 2x\,dx}{\frac{\pi}{4} - {}^{-}\frac{\pi}{4}} = \frac{\left[\frac{\sin 2x}{2}\right]_{-\pi/4}^{\pi/4}}{\frac{\pi}{2}} = \frac{\frac{1-{}^{-}1}{2}}{\frac{\pi}{2}} = \frac{2}{\pi}$

27. $\overline{f} = \frac{\int_{-\pi/2}^{\pi/2} \cos x\,dx}{\frac{\pi}{2} - {}^{-}\frac{\pi}{2}} = \frac{[\sin x]_{-\pi/2}^{\pi/2}}{\pi} = \frac{1-{}^{-}1}{\pi} = \frac{2}{\pi}$

35. $\overline{f} = \dfrac{\int_0^4 (8-2x)\,dx}{4-0} = \dfrac{\left[8x - x^2\right]_0^4}{4} = \dfrac{32-16}{4} = 4$

$4 = 8 - 2x \rightarrow -4 = -2x \rightarrow x = 2$

36. $\overline{f} = \dfrac{\int_0^2 e^x dx}{2-0} = \dfrac{\left[e^x\right]_0^2}{2} = \dfrac{e^2-1}{2}$

$e^x = \dfrac{e^2-1}{2} \rightarrow x = \ln\left(\dfrac{e^2-1}{2}\right) \simeq 1.161439362$

45. $\int_{-2}^{2} \dfrac{x^3 - 4x}{x^2+1}\,dx = 0$