M1B/Schoenbrun Homework-2

Section 5.2 Page. 359 (33,34,37,38, 41,42,45,67)
Section 5.3 Page 374 (29, 30, 36, 39, 49)

33. $\int_0^a f(x)\,dx = 16$

34. $\int_0^b f(x)\,dx = \int_0^a f(x)\,dx + \int_a^b f(x)\,dx = 16 + {}^{-}5 = 11$

37. $\int_0^{\pi} x\sin x\,dx = R_1 + R_2 = 1 + \pi - 1 = \pi$

38. $\int_0^{3\pi/2} x\sin x\,dx = R_1 + R_2 - R_3 - R_4 = 1 + (\pi - 1) - (\pi + 1) = 1$

41a. $\int_4^0 3x(4-x)\,dx = -\left[\int_0^4 3x(4-x)\,dx\right] = -32$

41b. $\int_0^4 x(x-4)\,dx = \frac{1}{3}\int_0^4 3x(x-4)\,dx = -\frac{1}{3}\left[\int_0^4 3x(4-x)\,dx\right] = -\frac{1}{3}(32) = -\frac{32}{3}$

41.c. $\int_4^0 6x(4-x)\,dx = 2\left[\int_4^0 3x(4-x)\,dx\right] = -2\left[\int_0^4 3x(4-x)\,dx\right] = -2(32) = -64$

41.d $\int_0^8 3x(4-x)\,dx = \int_0^4 3x(4-x)\,dx + \int_4^8 3x(4-x)\,dx = 32 + ?$ (Can't be done)

42.a $\int_1^4 (-3f(x))\,dx = -3\int_1^4 f(x)dx = -3(8) = -24$

42.b $\int_1^4 3f(x)\,dx = 3\int_1^4 f(x)dx = 3(8) = 24$

42.c

$$\int_6^4 12f(x)\,dx = 12\left[\int_6^1 f(x)dx + \int_1^4 f(x)dx\right] = 12\left[-\int_1^6 f(x)dx + \int_1^4 f(x)dx\right] = 12[-5+8] = 36$$

45a. $\int_0^1 \left(4x-2x^3\right)dx = -2\int_0^1 \left(x^3-2x\right)dx = -2\left(-\frac{3}{4}\right) = \frac{3}{2}$

45b. $\int_1^0 \left(2x-x^3\right)dx = -\int_1^0 \left(x^3-2x\right)dx = \int_0^1 \left(x^3-2x\right)dx = -\frac{3}{4}$

67a. $\int_1^4 3f(x)\,dx = 3(10-5) = 15$

67.b $\int_1^6 \left[f(x)-g(x)\right]dx = 10-5=5$

67.c $\int_1^4 \left[f(x)-g(x)\right]dx = (10-5)-(2)=3$

67.d $\int_4^6 \left[g(x)-f(x)\right]dx = (-2+5)-(5)=-8$

67.e $\int_4^6 8g(x)\,dx = 8(-2+5) = -24$

67.f $\int_4^1 2f(x)\,dx = 2(5-10) = -10$

Section 5.3

29. $\int_0^2 4x^3 dx = \left[x^4\right]_0^2 = 16 - 0 = 16$

30. $\int_0^2 \left(3x^2 + 2x\right) dx = \left[x^3 + x^2\right]_0^2 = 8 + 4 - 0 = 12$

36. $\int_0^{\ln 8} e^x \, dx = \left[e^x\right]_0^{\ln 8} = e^{\ln 8} - e^0 = 8 - 1 = 7$

39. $\int_0^{\pi/4} \sec^2 \theta \, d\theta = \left[\tan \theta\right]_0^{\pi/4} = \tan\left(\frac{\pi}{4}\right) - \tan(0) = 1 - 0 = 1$

40. $\int_1^{\sqrt{3}} \frac{dx}{1 + x^2} = \left[\arctan x\right]_1^{\sqrt{3}} = \arctan\left(\sqrt{3}\right) - \arctan(1) = \frac{\pi}{3} - \frac{\pi}{4} = \frac{\pi}{12}$