5.2: 22

$$\int_1^4 (x^2 - 4x + 2)\,dx =$$

$$\left(\frac{1}{3}x^3 - 2x^2 + 2x\right)\Big|_1^4 =$$

$$\frac{64}{3} - 32 + 8 - \left(\frac{1}{3} - 2 + 2\right) =$$

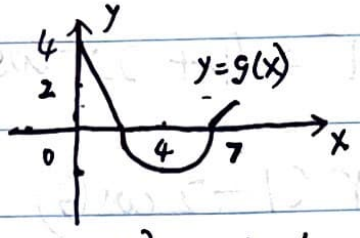
$$\frac{64}{3} - 24 - \frac{1}{3} = -3$$

5.2: 24 $\int_0^2 (2x - x^3)\,dx =$

$$\left(x^2 - \frac{1}{4}x^4\right)\Big|_0^2 =$$

$$4 - \frac{1}{4}(4 \cdot 4) = 0$$

5.2: 34



(a) $\int_0^2 g(x)\,dx =$ Area of the triangle $= 2 \cdot 4 \cdot \frac{1}{2} = 4$

(b) $\int_2^6 g(x)\,dx =$ Negative area of the half circle $= -\frac{1}{2}\pi \cdot 2^2 = -2\pi$

(c) $\int_0^7 g(x)\,dx = 4 - 2\pi +$ Area of the small triangle $= \frac{9}{2} - 2\pi$

5.3: 44 $\int_{-2}^{2} f(x)\,dx$, $f(x) = \begin{cases} 2 & -2 \le x \le 0 \\ 4 - x^2 & 0 < x \le 2 \end{cases}$

$$\int_{-2}^{2} f(x)\,dx = \int_{-2}^{0} f(x)\,dx + \int_0^2 f(x)\,dx =$$

$$2x\Big|_{-2}^{0} + \left(4x - \frac{1}{3}x^3\right)\Big|_0^2 =$$

$$4 + 8 - \frac{8}{3} = \frac{36}{3} - \frac{8}{3} = \frac{28}{3}$$

5.3: 06 $\int_{-1}^{2} \frac{4}{x^3}\,dx = -\frac{2}{x^2}\Big|_{-1}^{2} = \frac{3}{2}$ is a wrong equation

because $f(x)$ is not defined at $x=0$, we can't apply the fundamental theorem

5.3: 08 $\int_{0}^{\pi} \sec^2 x\,dx = \tan x\Big|_{0}^{\pi} = 0$ is a wrong equation

because $\sec^2 x = \frac{1}{\cos^2 x}$, which is not defined at $x=\frac{\pi}{2}$, the function is not continuous in $[0, \pi]$, we can't apply the fundamental theorem.