126 HW #2

5.3 #14, 22, 31

5.4 # 6, 26,

5.3 #14

$$h(x) = \int_0^{x^2} \sqrt{1+r^3}\ dx \qquad \frac{d}{dx} h(x) = \sqrt{1+(x^2)^3} \cdot 2x$$

chain rule from x^2

$$= 2x\sqrt{1+x^6}$$

5.3 #22

$$\int_0^1 1 + \frac{1}{2}u^4 - \frac{2}{5}u^9\, du = u + \frac{1}{2}\cdot\frac{1}{5}u^5 - \frac{2}{5}\frac{1}{10}u^{10} \Big|_0^1$$

$$= u + \frac{1}{10}u^5 - \frac{1}{25}u^{10} \Big|_0^1$$

$$= 1 + \frac{1}{10}(1)^5 - \frac{1}{25}(1)^{10} - \left(0 + \frac{1}{10}0^5 - \frac{1}{25}0^{10}\right)$$

$$= 1 + \frac{1}{10} - \frac{1}{25} = 1.06 = 53/50$$

5.3 #31

$$\int_0^{\pi/4} \sec^2 t\ dt = \tan t \Big|_0^{\pi/4} = \tan \pi/4 - \tan 0 = 1 - 0 = 1$$

5.4 #6

$$\int \sqrt{x^3} + \sqrt[3]{x^2}\, dx = \int x^{3/2} + x^{2/3}\, dx$$

$$= \frac{2}{5} x^{5/2} + \frac{3}{5} x^{5/3} + C$$

5.4 #26

$$\int_0^9 \sqrt{2t}\, dt = \int_0^9 (2t)^{1/2}\, dt$$

$$= \int_0^9 2^{1/2} t^{1/2}\, dt = \sqrt{2} \int_0^9 t^{1/2}\, dt$$

$$= \sqrt{2} \cdot \frac{2}{3} t^{3/2} \Big|_0^9$$

$$= \sqrt{2} \cdot \frac{2}{3} \left(9^{3/2} - 0^{3/2} \right)$$

$$9^{3/2} = (\sqrt{9})^3 = 3^3 = 27$$

$$= \frac{2\sqrt{2}}{3} \cdot 9^{3/2}$$

$$= 2\sqrt{2} \cdot 9 = 18\sqrt{2} = 25.46$$