

Math 1121 Homework #10

Section 7.1 # 51/55, # 58/62

Section 7.2 # 10/16, # 29/35

7.1 # 51/55

$$C'(x) = 5x - \frac{1}{x}, \quad C(10) = 94.20$$

$$C(x) = \int 5x - \frac{1}{x} dx = 5 \cdot \frac{1}{2} x^2 - \ln|x| + C$$

$$\frac{5}{2} \cdot 10^2 - \ln|10| + C = 94.20$$

$$C = 94.20 - \frac{5}{2} \cdot 10^2 + \ln|10| = -153.5$$

$$C(x) = \frac{5}{2} x^2 - \ln|x| - 153.5$$

7.1 # 58/62

$$P'(x) = x^{1/2} + \frac{1}{2}$$

$$P(0) = -1 \quad (\text{"in thousands"})$$

$$P(x) = \int x^{1/2} + \frac{1}{2} dx = \frac{1}{3/2} x^{3/2} + \frac{1}{2} x + C$$

$$\frac{1}{3/2} \cdot 0^{3/2} + \frac{1}{2} \cdot 0 + C = -1$$

$$C = -1$$

$$P(x) = \frac{2}{3} x^{3/2} + \frac{1}{2} x - 1$$

7.2 #10/16

$$\int r \sqrt{5r^2+2} \, dr$$

$$u = 5r^2 + 2$$

$$du = 10r \, dr$$

$$\frac{1}{10} du = r \, dr$$

$$= \int r u^{1/2} \, dr = \int u^{1/2} r \, dr = \int u^{1/2} \cdot \frac{1}{10} \, du$$

$$= \frac{1}{10} \int u^{1/2} \, du = \frac{1}{10} \cdot \frac{1}{3/2} u^{3/2} + C$$

$$= \frac{1}{10} \cdot \frac{2}{3} (5r^2+2)^{3/2} + C$$

7.2 #29/35

$$\int \frac{(1+3\ln x)^2}{x} \, dx$$

$$u = 1 + 3\ln x$$

$$du = 3 \cdot \frac{1}{x} \, dx$$

$$\frac{1}{3} du = \frac{1}{x} \, dx$$

$$\rightarrow = \int \frac{u^2}{x} \, dx = \int u^2 \cdot \frac{1}{x} \, dx = \int u^2 \cdot \frac{1}{3} \, du$$

$$= \frac{1}{3} \int u^2 \, du = \frac{1}{3} \cdot \frac{1}{3} u^3 + C$$

$$= \frac{1}{9} (1+3\ln x)^3 + C$$