

Math 122

HW #3

~~7.1~~ 7.1 # 32, 39, 48, 60

7.2 # 3

7.1 #32

$$\int \frac{1}{x} - 3e^{-4x} dx = 9 \ln x - \frac{3}{-4} e^{-4x} + C$$
$$= 9 \ln x + \frac{15}{2} e^{-4x} + C$$

7.1 #39

$$\int \frac{\sqrt{x+1}}{\sqrt[3]{x}} dx = \int \frac{\sqrt{x}}{\sqrt[3]{x}} + \frac{1}{\sqrt[3]{x}} dx = \int \frac{x^{1/2}}{x^{1/3}} + \frac{1}{x^{1/3}} dx$$
$$= \int x^{1/2 - 1/3} + x^{-1/3} dx$$
$$= \int x^{1/6} + x^{-1/3} dx = \frac{6}{7} x^{7/6} + \frac{3}{2} x^{2/3} + C.$$

7.1 #48

$$C'(x) = x^{1/2}, \quad C(16) = 45$$

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

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

$$45 = \frac{2}{3} (16)^{3/2} + C$$

$$45 = \frac{2}{3} \cdot 64 + C$$

$$C = 2.33 = \frac{7}{3}$$

So

$$C(x) = \frac{2}{3} x^{3/2} + \frac{7}{3}.$$

7.1 #60

$$f'(t) = .01 e^{-.01t}$$

$$a) \quad f(t) = \int f'(t) dt = \int .01 e^{-.01t} = -e^{-.01t} + C$$

$$b) \quad f(0) = 0, \quad \text{so}$$

$$f(t) = -e^{-.01t} + C$$

$$0 = -e^{-.01 \cdot 0} + C$$

$$0 = -1 + C$$

$$C = 1.$$

$$\text{so } f(t) = -e^{-.01t} + 1$$

$$\text{so } f(10) = -e^{-.01 \cdot 10} + 1 = -e^{-.1} + 1 = .095$$

7.2 #3

$$\int 4(2x+3)^4 dx$$

$$u = 2x+3$$

$$du = 2 dx$$

$$\frac{1}{2} du = dx$$

$$\int 4 u^4 \cdot \frac{1}{2} du = \int 2u^4 du$$

$$= \frac{2}{5} u^5 + C = \frac{2}{5} (2x+3)^5 + C$$