

Math 122 HW #8

Section 8.3 5a, 5b, 10a, 18, 19

$$\begin{aligned} \#5a \quad P &= \int_0^{10} 400 e^{.003x} e^{-.08x} dx = 400 \int_0^{10} e^{-.05x} dx \\ &= 400 \cdot \frac{1}{-.05} e^{-.05x} \Big|_0^{10} = \frac{-400}{.05} (e^{-.05 \cdot 10} - e^0) \\ &= \frac{-400}{.05} (e^{-.5} - 1) = 3,147.75 \end{aligned}$$

$$\#5b \quad A = e^{rt} P = e^{.08 \cdot 10} \cdot \underline{3,147.75} = 7005.45$$

$$\#10a \quad P = \int_0^{10} 50x e^{-.08x} dx \quad \text{parts:} \quad \begin{array}{l} u = 50x \quad du = 50 dx \\ dv = e^{-.08x} \quad v = \frac{-1}{.08} e^{-.08x} \end{array}$$

$$\begin{aligned} &= 50x \cdot \frac{-1}{.08} e^{-.08x} - \int \frac{-1}{.08} e^{-.08x} \cdot 50 dx \\ &= 50x \cdot \frac{-1}{.08} e^{-.08x} + \frac{50}{.08} \int e^{-.08x} dx \\ &= 50x \cdot \frac{-1}{.08} e^{-.08x} + \frac{50}{.08} \left(\frac{-1}{.08} e^{-.08x} \right) \Big|_0^{10} \\ &= 50 \cdot 10 \cdot \frac{-1}{.08} e^{-.08 \cdot 10} + \frac{50}{.08} \left(\frac{-1}{.08} e^{-.08 \cdot 10} \right) - \left(0 + \frac{50}{.08} \left(\frac{-1}{.08} \cdot e^0 \right) \right) \end{aligned}$$

#18 $f(x) = 1000 e^{.05x}$ $t=4$ $r=.11$

$$P = \int_0^4 1000 e^{.05x} \cdot e^{-.11x} dx = 1000 \int_0^4 e^{-.06x} dx$$

$$= \frac{1000}{-.06} e^{-.06x} \Big|_0^4 = \frac{1000}{-.06} e^{-.06 \cdot 4} - \frac{1000}{-.06} e^0 = 3556.20$$

#19

$$P = \int_0^5 (1500 - 60x^2) e^{-.1x} dx \quad \text{parts:} \quad \begin{array}{l} u = 1500 - 60x^2 \quad du = -120x \\ dv = e^{-.1x} dx \quad v = \frac{-1}{.1} e^{-.1x} = -10e^{-.1x} \end{array}$$

$$= (1500 - 60x^2) \cdot -10e^{-.1x} - \int -10e^{-.1x} \cdot (-120x) dx$$

$$= (1500 - 60x^2) \cdot -10e^{-.1x} - 1200 \int x e^{-.1x} dx \quad \text{parts} \quad \begin{array}{l} u = x \quad du = dx \\ dv = e^{-.1x} \quad v = -10e^{-.1x} \end{array}$$

$$= (1500 - 60x^2) \cdot -10e^{-.1x} - 1200 \left(x \cdot -10e^{-.1x} - \int -10e^{-.1x} \cdot dx \right)$$

$$= (1500 - 60x^2) \cdot -10e^{-.1x} - 1200 \left(x \cdot -10e^{-.1x} + 10 \cdot -10e^{-.1x} \right) \Big|_0^5$$

$$= (1500 - 60 \cdot 5^2) \cdot -10e^{-.5} - 1200 \left(5 \cdot -10e^{-.5} + -100e^{-.5} \right)$$

$$- \left(1500 \cdot -10 - 1200 (0 + -100) \right)$$