

Math 122 HW #8

Section 8.3 5, 10a, 18, 19

5a
$$P = \int_0^{10} 400 e^{.03x} e^{-.08x} dx = \int_0^{10} 400 e^{-.05x} dx$$

$$= 400 \cdot \frac{1}{-.05} e^{-.05x} \Big|_0^{10} = -8000 e^{-.05x} \Big|_0^{10} = -8000 e^{-.5} - -8000 e^0$$

$$= \underbrace{-8000 e^{-.5} + 8000}_{= 3147.75}$$

5b
$$A = e^{.08 \cdot 10} P = e^{.8} P \quad \text{where } P = \boxed{}$$

$$= 7005.46$$

10a
$$P = \int_0^{10} 50x e^{-.08x} dx$$

parts: $u = 50x \quad du = 50 dx$
 $dv = e^{-.08x} \quad v = \frac{1}{-.08} e^{-.08x}$

$$= 50x \cdot \frac{1}{-.08} e^{-.08x} - \int \frac{1}{-.08} e^{-.08x} \cdot 50 dx$$

$$= \frac{50}{-.08} x e^{-.08x} + \frac{50}{.08} \int e^{-.08x} dx = \frac{50}{-.08} x e^{-.08x} + \frac{50}{.08} \cdot \frac{1}{-.08} e^{-.08x} \Big|_0^{10}$$

$$= \frac{50}{-.08} \cdot 10 \cdot e^{-.08 \cdot 10} + \frac{50}{.08} \cdot \frac{1}{-.08} e^{-.08 \cdot 10} - \left(0 + \frac{50}{.08} \cdot \frac{1}{-.08} e^0 \right)$$

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

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

$$= 1000 \cdot \frac{1}{-.06} e^{-.06x} \Big|_0^4 = \frac{1000}{-.06} e^{-.06 \cdot 4} - \frac{1000}{-.06}$$

$$A = e^{.11 \cdot 4} \cdot P$$

#19 $P = \int_0^5 (1500 - 60x^2) e^{-.1x} dx$

parts: $u = 1500 - 60x^2$ $du = -120x$
 $dv = e^{-.1x}$ $v = \frac{1}{-.1} e^{-.1x}$
 $= -10 e^{-.1x}$

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

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

parts: $u = x$ $du = dx$
 $v = e^{-.1x}$ $dv = -10 e^{-.1x}$

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

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

$$= (1500 - 60 \cdot 25) \cdot -10 e^{-.5} - 1200 \left(-10 \cdot 5 \cdot e^{-.5} + 10 \cdot e^{-.5} \right)$$

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