

# 6.4 HW Questions #17, #21, #23

17  $\int_0^1 18(3x+1)^5 dx$

bc this piece is here  
we should begin w/ (u)  
Substitution.

$$u = 3x + 1$$
$$du = 3dx$$

$$= \frac{1}{3} \cdot 18 \int_0^1 (3x+1)^5 \cdot 3 dx$$

$$= \frac{(3x+1)^6}{6} \Big|_{0=x}^{1=x}$$

$$= (3(1)+1)^6 - (3(0)+1)^6 = 4096 - 1 = 4095$$

21  $\int_0^2 2^{-x+1} dx$

u = substitution?

~~the~~  $b^x dx = \frac{b^x}{\ln b} + C$  [basic integration of  $b^x$ ]

$$u = -x + 1$$
$$du = -dx$$

$$= \int_0^2 2^{-x+1} dx$$

$$= \frac{-2^{-x+1}}{\ln 2} \Big|_{0=x}^{2=x}$$

$$\left( \frac{-2^{-2+1}}{\ln 2} \right) - \left( \frac{-2^{-0+1}}{\ln 2} \right) = \frac{-2^{-1}}{\ln 2} + \frac{2^1}{\ln 2} = \frac{-1}{2 \ln 2} + \frac{2}{\ln 2}$$

$$= 2.164$$

\*To check on calculator & confirm answer  
have to input original equation of  
 $2^{-x+1}$ , not the integrated equation.

Calculator = 2.164 also ✓.

(23)  $\int_{\emptyset}^{50} e^{-0.02x-1} dx$        $u = -0.02x - 1$   
 $du = -0.02 dx$

$= \frac{-1}{-0.02} \int_{\emptyset}^{50} e^{-0.02x-1} (-0.02) dx$

$= \frac{-1}{0.02} e^{-0.02x-1} \Big|_{x=\emptyset}^{x=50}$

let calculator do work

$= 11.627208$  ✓

\*adjust window settings  
to -2 to 55 b/c looking  
to lower limit =  $\emptyset$ ; upper limit = 50\*

This piece

~~= 50~~

$\rightarrow 50 - 50e^{-0.02(50)-1} - (-50e^{-0.02(0)-1})$

$= -50e^{-2} + 50e^{-1}$  or  $50(-e^{-2} + e^{-1})$

$= 11.6272079$  ✓