

A

MATH 1231 Quiz 7 (50pts)  
Fall 2014

Solution

Name: \_\_\_\_\_

**Calculators are NOT permitted.**

In problems 1-5, find the indicated general antiderivative. (5 points each)

1.  $\int \left( 8.6e^{-1.2x} - \frac{3}{10} \right) dx$

$$= \frac{8.6e^{-1.2x}}{-1.2} - \frac{3x}{10} + C$$

2.  $\int \left( \frac{8}{5x^3} + 6\sqrt{x} \right) dx$

$$= \int \frac{8}{5}x^{-3} + 6x^{\frac{1}{2}} dx = \left( \frac{8}{5} \right) \frac{x^{-2}}{-2} + \frac{6x^{\frac{3}{2}}}{\frac{3}{2}} + C$$

3.  $\int \frac{d}{dx} (\ln(5x^2 + 3)) dx$

$$= \ln(5x^2 + 3) + C$$

4.  $\int (10e^x - 32x^7) dx$

$$= 10e^x - \frac{32x^8}{8} + C$$

5.  $\int \left( \frac{3.5}{2x} - \frac{7^x}{3} \right) dx$

$$= \frac{3.5 \ln|x|}{2} - \frac{7^x}{3 \ln 7} + C$$

A

Solution

6. (5 points) Compute  $\frac{d}{dx} \left( \int \frac{x^7 + xe^x}{\ln(x^4 + \sqrt{x})} dx \right)$

$$= \frac{x^7 + xe^x}{\ln(x^4 + \sqrt{x})}$$

7. (10 Points) Find  $F$ , the specific antiderivative of the function  $f$ , when  $f(x) = 4x^3 - 6x^{-2}$ , and  $F(2) = 10$ .

$$F(x) = \int f(x) dx = x^4 + 6x^{-1} + C$$

$$F(2) = 2^4 + \frac{6}{2} + C = 10$$

$$19 + C = 10$$

$$C = -9$$

$$F(x) = x^4 + 6x^{-1} - 9$$

8. (10 points) The rate of change of books purchased by Snell Library can be modeled by the function:

$$r(t) = 0.125t^2 - 1.5t + 3$$

hundred books per year,  $t$  years after 1990. Find a model for  $B(t)$ , the number of books purchased by Snell Library  $t$  years after 1990. Use the fact that 1000 books were purchased in 1990. Give units.

$$B(t) = \int r(t) dt = \frac{0.125t^3}{3} - \frac{1.5t^2}{2} + 3t + C$$

$$B(0) = 1000$$

$$C = 1000$$

$$B(t) = \frac{0.125t^3}{3} - \frac{1.5t^2}{2} + 3t + 1000$$

hundred books

# B Solution

MATH 1231 Quiz 7 (50pts)  
Fall 2014

Name: \_\_\_\_\_

**Calculators are NOT permitted.**

In problems 1-5, find the indicated general antiderivative. (5 points each)

1.  $\int \left( 8.4e^{-1.3x} - \frac{7}{10} \right) dx$

$$= \frac{8.4 e^{-1.3x}}{-1.3} - \frac{7x}{10} + C$$

2.  $\int \left( \frac{6}{5x^3} + 5\sqrt{x} \right) dx$

$$= \int \frac{6x^{-3}}{5} + 5x^{\frac{1}{2}} dx = \frac{6}{5} \left( \frac{x^{-2}}{-2} \right) + \frac{5x^{\frac{3}{2}}}{\frac{3}{2}} + C$$

3.  $\int \frac{d}{dx} (\ln(7x^3 + 4)) dx$

$$= \ln(7x^3 + 4) + C$$

4.  $\int (12e^x - 42x^6) dx$

$$= 12e^x - \frac{42x^7}{7} + C$$

5.  $\int \left( \frac{3.7}{2x} - \frac{5^x}{6} \right) dx$

$$= \frac{3.7}{2} \ln|x| - \frac{5^x}{6 \ln 5} + C$$

# B Solution

6. (5 points) Compute  $\frac{d}{dx} \left( \int \frac{x^5 + xe^x}{\ln(x^3 + \sqrt{x})} dx \right)$

$$= \frac{x^5 + xe^x}{\ln(x^3 + \sqrt{x})}$$

7. (10 Points) Find  $F$ , the specific antiderivative of the function  $f$ , when  $f(x) = 4x^3 - 6x^{-2}$ , and  $F(2) = 11$ .

$$F(x) = \int f(x) dx = x^4 + 6x^{-1} + C$$

$$F(2) = 2^4 + \frac{6}{2} + C = 11$$

$$19 + C = 11$$

$$F(x) = x^4 + 6x^{-1} - 8$$

$$C = -8$$

8. (10 points) The rate of change of books purchased by Snell Library can be modeled by the function:

$$r(t) = 0.125t^2 - 1.5t + 2$$

hundred books per year,  $t$  years after 1980. Find a model for  $B(t)$ , the number of books purchased by Snell Library  $t$  years after 1980. Use the fact that 900 books were purchased in 1980. Give units.

$$B(t) = \int r(t) dt = \frac{0.125t^3}{3} - \frac{1.5t^2}{2} + 2t + C$$

$$B(0) = C = 900$$

$$B(t) = \frac{0.125t^3}{3} - \frac{1.5t^2}{2} + 2t + 900 \quad \text{hundred books}$$