

# Integrals

Name \_\_\_\_\_

Class \_\_\_\_\_

Date \_\_\_\_\_

## ANSWERS

1a

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1b

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2a

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2b

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3a

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3b

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4a

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4b

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5a

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5b

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6a

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6b

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Find the initial forms of the following functions

1 . a )  $f(x) = 4 \cos \frac{x}{4} - 2 \sin 2x + 2\sqrt[3]{x}$

b )  $f(x) = 3 \sin \frac{x}{3} + 2 \cos 2x - \sqrt[4]{x}$

2 . a )  $f(x) = x\sqrt{x} - \frac{1}{\cos^2 x} + \frac{1}{x}$

b )  $f(x) = \sqrt[3]{x^2} + 3^{2x} + \frac{4}{\sin^2 x}$

3 . a )  $f(x) = -\frac{2}{\sqrt{4x-1}} + \frac{2}{x^2} - 3x$

b )  $f(x) = \sqrt{4x-1} - \frac{1}{x^4} + 2x$

4 . a )  $f(x) = x\sqrt[3]{x} - 2\sqrt{x} + 3$

b )  $f(x) = \frac{3}{\sqrt[3]{x}} - 2x\sqrt{x} - 2$

5 . a )  $y = \operatorname{tg}^2 x$

b )  $y = \operatorname{ctg}^2 x$

6 . a )  $y = 2e^{4x} + x$

b )  $y = e^{-x}$

# B

# INTEGRAL

Name \_\_\_\_\_

Class \_\_\_\_\_

Date \_\_\_\_\_

## ANSWERS

1a \_\_\_\_\_

1b \_\_\_\_\_

2a \_\_\_\_\_

2b \_\_\_\_\_

3a \_\_\_\_\_

3b \_\_\_\_\_

4a \_\_\_\_\_

4b \_\_\_\_\_

5a \_\_\_\_\_

5b \_\_\_\_\_

6a \_\_\_\_\_

6b \_\_\_\_\_

Solve the following differential equations

1. a.  $y'' = \frac{x^3 + 1}{2}$

b.  $y'' = \frac{x^2 - 1}{3}$

2. a.  $y' = 4 + y^2$

b.  $y' = xy^4$

3. a.  $y' = \frac{1 + y^2}{x^3}$

b.  $y' = \frac{1 + y^2}{x^2}$

4. a.  $y'' = -9y$

b.  $y'' + 25y = 0$

5. a.  $y' = y \ln x$

b.  $y' = y^2 x$

6. a.  $y' = \frac{1}{2} \sin^2 y$

b.  $y' = \frac{1}{4} \cos^2 y$

# C

## ANSWERS

1a

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1b

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2a

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2b

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3a

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3b

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4a

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4b

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5a

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5b

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6a

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6b

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Find the integrals

1) a)  $f(x) = \int_1^3 (x + 2\sqrt{x}) dx$

b)  $f(x) = \int_1^3 (\sqrt{x} - 2x^2) dx$

2) a)  $f(x) = \int_0^1 \frac{(4x+1)^3}{3} dx$

b)  $f(x) = \int_0^2 (1 - \frac{x}{2}) dx$

3) a)  $f(x) = \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin(\pi - \frac{x}{2}) \cdot \sin(\frac{3\pi}{2} - \frac{x}{2}) dx$

b)  $f(x) = \int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \cos(\pi + \frac{x}{2}) \cdot \sin(\frac{3\pi}{2} - \frac{x}{2}) dx$

4) a)  $f(x) = \int_{\frac{\pi}{12}}^{\frac{\pi}{2}} (\frac{1}{\cos^2 2x} + \frac{1}{\sin^2 3x}) dx$

b)  $f(x) = \int_{\frac{\pi}{6}}^{\frac{\pi}{2}} (\frac{1}{\sin^2 3x} - \frac{1}{\cos^2 2x}) dx$

5) a)  $f(x) = \int_1^{e^2} (\frac{1}{x} + \frac{1}{2\sqrt{x}}) dx$

b)  $f(x) = \int_2^{e+1} (\frac{1}{x-1} - 1) dx$

6) a)  $f(x) = \int_1^4 \frac{5\sqrt{x}}{x} dx$

b)  $f(x) = \int_1^8 \frac{3\sqrt[3]{x}}{x} dx$

# B

## ANSWERS

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**1a**

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**1b**

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**2a**

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**2b**

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**3a**

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**3b**

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**4a**

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**4b**

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**5a**

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**5b**

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**6a**

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**6b**

Find the integrals of the following functions.

1. a.  $\int \frac{dx}{x^2 + 2x + 5}$

b.  $\int \frac{dx}{3x^2 - 2x + 4}$

2. a.  $\int \frac{\sin 2x}{\sqrt{1 + \cos^2 x}} dx$

b.  $\int \frac{\sin 2x}{\sqrt{1 + \sin^2 x}} dx$

3. a.  $\int \frac{x - \arctg x}{1 + x^2} dx$

b.  $\int \frac{x - \arctg x}{1 + x^2} dx$

4. a.  $\int_0^{\frac{\pi}{2}} \cos^2 x \sin x dx$

b.  $\int_0^{\frac{\pi}{2}} \cos x \sin^4 x dx$

5. a.  $\int_1^2 (1 + 3x)^4 dx$

b.  $\int_1^2 (1 + 2x)^5 dx$

6. a.  $\int_0^1 \frac{dx}{\sqrt[3]{1 + 2x}}$

b.  $\int_0^1 \frac{xdx}{(x^2 + 1)^3}$

# C

## ANSWERS

1a1b2a2b3a3b4a4b

1) a)  $\int_1^4 \frac{\sqrt[3]{x^{15}}}{x^2 \cdot \sqrt{x}} dx$

b)  $\int_1^{16} \frac{\sqrt[4]{x^3}}{x\sqrt{x}} dx$

2) a)  $\int_1^2 \frac{\sqrt{x^5 - x}}{x^2} dx$

b)  $\int_1^4 \frac{x + \sqrt{x^5}}{x^2} dx$

3) a)  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} (\cos^2(x - \frac{\pi}{3}) - \sin^2(x - \frac{\pi}{3})) dx$

b)  $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \cos(x - \frac{\pi}{4}) \cdot \sin(x - \frac{\pi}{4}) dx$

4) a)  $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \frac{\sin 2x - 3 \cdot \sin^2 x}{\sin x} dx$

b)  $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} (2 \sin 3x \cdot \cos 5x) dx$

**A N S W E R S**1a1b2a2b3a3b4a4b5a5b6a6b

1. a. Calculate the integral of the

function  $f(x) = \frac{1}{\cos^2 3x} + e^{2x+3} - 1$

b. Calculate  $\int_0^1 (x+1)^3 dx$

Calculate the following definite integrals

2. a.  $\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} (\cos 3x - \sin 3x) dx$

b.  $\int_{-2}^{-1} 3^x dx$

3. a.  $\int_1^e (x^{-1} - 1) dx$

b.  $\int_{-1}^1 \frac{x^3 + x^2 + x + 1}{x + 1} dx$

4. a.  $\int_0^{\pi} (\cos x \cos 2x - \sin x \sin 2x) dx$

b.  $\int_1^{16} \frac{\sqrt[4]{x}}{\sqrt{x}} dx$

Find the areas bounded by the given curves

5. a.  $y = x$ ,  $y = 1$ ,  $y = 0$

b.  $y = x^2$ ,  $x = -4$ ,  $y = 0$

6. a.  $y = \frac{1}{x-1}$ ,  $x = 2$ ,  $x = 4$ ,  $y = 1$

b.  $y = \sqrt{x}$ ,  $x = 4$ ,  $x = 9$ ,  $y = 0$

**C**