

كراسة تمارين التكامل بالتعويض الاستبدال في التفاضل والتكامل غير محلول



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ← المناهج الإماراتية ← الصف الحادي عشر المتقدم ← رياضيات ← الفصل الثاني ← مذكرات وبنوك ← الملف

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ملفات اكتب للمعلم اكتب للطالب | الاختبارات الالكترونية | اختبارات | حلول | عروض بوربوينت | أوراق عمل
منهج انجليزي | ملخصات وتقارير | مذكرات وبنوك | الامتحان النهائي للمدرس

المزيد من مادة
رياضيات:

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التواصل الاجتماعي بحسب الصف الحادي عشر المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة رياضيات في الفصل الثاني

كراسة تمارين التكامل بالتعويض الاستبدال في التفاضل والتكامل غير محلول

1

تجميعة نهائية وفق مخرجات الهيكل منهج بريدج Bridge

2

هيكل الامتحان النهائي للفصل الدراسي الثاني منهج بريدج

3

عرض بوربوينت الدرس الثاني Identities Trigonometric Verifying من الوحدة الحادية عشرة منهج ريفيل

4

عرض بوربوينت الدرس الأول Identities Trigonometric من الوحدة الحادية عشرة منهج ريفيل

5

General Steps:

1. Choose a new variable u (innermost expression).
2. Compute $du = \frac{du}{dx} dx$.
3. Replace all terms with u and du . Evaluate integral.
4. Replace u with corresponding x expression.

Choosing the correct substitution (u):

- A) Brackets:** $(x^2 + 1)^5 \rightarrow u = x^2 + 1$ **B) Roots:** $\sqrt{3x^2 + 2} \rightarrow u = 3x^2 + 2$
C) Exponents: $e^{x^2+2} \rightarrow u = x^2 + 2$ **D) Angles:** $\sin(3x^4) \rightarrow u = 3x^4$

I. Evaluate the Indefinite Integrals

1 $\int x^2(x^3 + 2)^{100} dx$

Student Workspace

2 $\int (3x + 4)^7 dx$

Student Workspace

3 $\int x \sin x^2 dx$

Student Workspace

4 $\int (3 \tan x + 4)^5 \sec^2 x dx$

Student Workspace

5 $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

Student Workspace

6 $\int \frac{x^5}{1 + x^6} dx$

Student Workspace

7 $\int \frac{(\sin^{-1} x)^3}{\sqrt{1 - x^2}} dx$

Student Workspace

8 $\int x\sqrt{2 - x} dx$

Student Workspace

Lesson 5.6

Integration by Substitution

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Unit 5 - Term 3

$$9 \quad \int \frac{x^3}{\sqrt{4-x^4}} dx$$

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Student Workspace

$$10 \quad \int \frac{(\sqrt{x}+1)^4}{\sqrt{x}} dx$$

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$$11 \quad \int \frac{1}{\sqrt{x}(\sqrt{x}+1)} dx$$

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$$12 \quad \int \frac{1}{\sqrt{1+\sqrt{x}}} dx \quad (\text{Hint: Let } 1+\sqrt{x}=u)$$

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Lesson 5.6

Integration by Substitution

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Unit 5 - Term 3

$$13 \quad \int \frac{3}{\sqrt[4]{x}+x} dx$$

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$$14 \quad \int \frac{3\sqrt{x}}{1+x^3} dx$$

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$$15 \quad \int \frac{1}{\sqrt{x}(1+x)} dx$$

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$$16 \quad \int xe^{x^2} dx$$

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Lesson 5.6

Integration by Substitution

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Unit 5 - Term 3

17 $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

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18 $\int \frac{\sqrt{\ln x}}{x} dx$

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19 $\int \frac{\ln \sqrt{x}}{x} dx$

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20 $\int e^x \sqrt{e^x + 4} dx$

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Lesson 5.6

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Unit 5 - Term 3

21 $\int \frac{\cos(1/x)}{x^2} dx$

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22 $\int \frac{x}{\sqrt{1-x^4}} dx$ (Hint: Let $u = x^2$)

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23 $\int \frac{1+x}{1-x^2} dx$ (Hint: Factor denominator)

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24 $\int \frac{1+x}{1+x^2} dx$

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Integration by Substitution

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Unit 5 - Term 3

25 $\int \sin^3 x \cos x dx$

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26 $\int \frac{e^{\tan x}}{1 - \sin^2 x} dx$

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27 $\int x^2 \csc^2 x^3 dx$

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28 $\int \tan 4x dx$

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Unit 5 - Term 3

29 $\int \frac{\ln(\sin x)}{\tan x} dx$

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30 $\int \frac{\cos(\ln x)}{x} dx$

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31 $\int \sec^2 x \sqrt{1 - 2 \tan x} dx$

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32 $\int \frac{x - 1}{1 + 2x - x^2} dx$

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Unit 5 - Term 3

$$33 \quad \int \frac{x^2}{\sqrt{1-x^6}} dx \quad (\text{Let } u = x^3)$$

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$$34 \quad \int \frac{3x^2}{1+x^6} dx$$

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$$35 \quad \int \frac{x-2}{x+7} dx$$

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$$36 \quad \int \cos(\tan 3x) \sec^2 3x dx$$

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Lesson 5.6

Integration by Substitution

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Unit 5 - Term 3

$$37 \quad \int \frac{x\sqrt{x}}{1+x^5} dx \quad (\text{Let } x^{5/2} = u)$$

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$$38 \quad \int \sec^2 x \sqrt{\tan x} dx$$

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$$39 \quad \int \frac{(1+\sin x)^5}{\sec x} dx$$

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$$40 \quad \int \frac{\sqrt{1-\sin^2 x}}{1+\sin^2 x} dx$$

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Student Workspace

I. Evaluate the Indefinite Integrals

$$41 \int \frac{3}{(1+x^2)\tan^{-1}x} dx$$

Student Workspace

$$42 \int \frac{2}{x^{2/3} - x^{5/6}} dx \quad (\text{Let } u = x^{1/6})$$

Student Workspace

II. Evaluate Definite Integrals

$$43 \int_1^2 x^3 \sqrt{x^4 + 1} dx$$

Student Workspace

$$44 \int_1^e \frac{\ln x}{x} dx$$

Student Workspace

$$45 \int_1^e \frac{1}{x \ln x + x} dx$$

Student Workspace

$$46 \int_{-1}^1 \frac{t}{(1+t^2)^2} dt$$

Student Workspace

$$47 \int_0^{\ln 2} \frac{e^t}{1+e^{2t}} dt$$

Student Workspace

$$48 \int_0^{\ln 2} \frac{e^t}{1+e^t} dt$$

Student Workspace

III. Definite Integrals & Properties

49 If $\int_0^1 f(x)dx = 3$, Find $\int_0^{\pi/2} \cos x f(\sin x)dx$

Student Workspace

50 If $\int_1^2 f(x)dx = 4$, Find $\int_1^4 \frac{f(\sqrt{x})}{\sqrt{x}}dx$

Student Workspace

51A If $\int_1^2 f(x)dx = 3$, find: $\int_2^4 f\left(\frac{x}{2}\right)dx$

Student Workspace

51B If $\int_1^2 f(x)dx = 3$, find: $\int_0^{\ln 2} e^x f(e^x)dx$

Student Workspace

IV. Word Problems & Generalizations

52A For $I = \int_0^{10} \frac{\sqrt{x}}{\sqrt{x} + \sqrt{10-x}} dx$, show that $I = \int_0^{10} \frac{\sqrt{10-x}}{\sqrt{x} + \sqrt{10-x}} dx$.

Student Workspace

52B Generalize to $I = \int_0^a \frac{f(x)}{f(x) + f(a-x)} dx$ for any positive a , then find the value of $\int_0^5 \frac{f(x)}{f(x) + f(5-x)} dx$ and $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$.

Student Workspace

- 53 When a patient is undergoing surgery, he is injected with anesthesia, and after t hours the concentration of anesthetic in the patient's blood is

$$C(t) = \frac{2t}{\sqrt{(36 + t^2)^3}} \text{ mg/cm}^3.$$

Find the average concentration of anesthesia in the blood during the first eight hours after injection.

Student Workspace

- 54 The Weather station observed the temperature C in a city after midnight, so it was found that it can be modeled with as the following: $T(t) = 3 - \frac{1}{3}(t - 5)^2$ °C where t is the time after midnight. Find the average temperature in the city from 10 AM to 3 PM.

Student Workspace

- 55 If both $F(x) = \frac{-1}{x^2 + 1}$ and $G(x) = \frac{x^2}{x^2 + 1}$ are antiderivatives of the same function $f(x)$, then the value of the constant C by which the two functions F and G differ is:

A. $C = 1$

B. $C = -1$

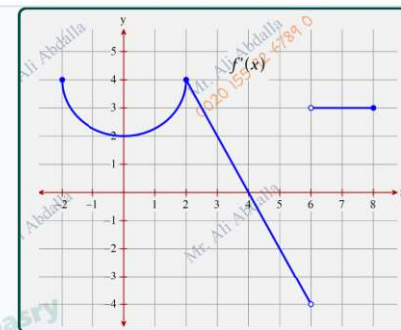
C. $C = \pm 1$

D. Cannot be determined

Student Workspace

V. Graphical Analysis

- 56 The function f is continuous for all real values of x . A portion of the graph of the function f' , the derivative of f , on $[-2, 8]$ is shown on the right and consists of a semicircle and two linear pieces.



- A) Find the x coordinate of each critical point of f on $[-2, 8]$. Classify each as a local max/min or neither.
- B) Find the x coordinate of each point of inflection for f on $(-2, 6)$.
- C) Find $\lim_{x \rightarrow 4} \frac{\int_2^x f'(t) dt - 4}{3(x - 4)^2}$.
- D) Evaluate: $\int_{-2}^1 f'(4 - 2x) dx$ and $\int_{-2}^3 f'(4 - 2x) dx$
- E) Let $g(x) = f'(x) \cdot x^2$ find $g'(3)$

Student Workspace

VI. Shortcuts: Integrals Involving $(ax + b)$

Rule	Example
$\int (ax + b)^n dx = \frac{(ax + b)^{n+1}}{a(n + 1)} + C$	$\int (3x - 1)^2 dx = \frac{(3x - 1)^3}{9} + C$
$\int (ax + b)^{-1} dx = \frac{1}{a} \ln ax + b + C$	$\int (3 - 2x)^{-1} dx = -\frac{1}{2} \ln 3 - 2x + C$
$\int e^{ax+b} dx = \frac{1}{a} e^{ax+b} + C$	$\int e^{-x+4} dx = -e^{-x+4} + C$
$\int c^{ax+b} dx = \frac{1}{a \ln c} c^{ax+b} + C$	$\int 2^{-3x+4} dx = -\frac{1}{3 \ln 2} 2^{-3x+4} + C$
$\int \sqrt{ax + b} dx = \frac{2}{3a} (ax + b)^{3/2} + C$	$\int \sqrt{2x + 5} dx = \frac{1}{3} (2x + 5)^{3/2} + C$

VII. Challenge Training

T1 $\int x^8 \left(2 + \frac{3}{x}\right)^8 dx$

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T2 $\int x^9 \left(2 - \frac{3}{x}\right)^8 dx$

Student Workspace

VIII. Past Exams Questions

1 $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = \dots + c$

A. $\frac{1}{2e^{\sqrt{x}}}$ B. $\frac{2}{e^{\sqrt{x}}}$

C. $\frac{1}{2} e^{\sqrt{x}}$ D. $2e^{\sqrt{x}}$

Student Workspace

2 $\int x^3 \sqrt{x^4 + 3} dx = \dots + c$

A. $\frac{1}{2} (x^4 + 3)^{3/2}$ B. $\frac{1}{6} x^4 (x^5 + 3)^{3/2}$

C. $\frac{1}{6} (x^4 + 3)^{1/2}$ D. $\frac{1}{6} (x^4 + 3)^{3/2}$

Student Workspace

3 $\int \frac{3\sqrt{x}}{1+x^3} dx$

Student Workspace

4 $\int x(x^2 + 1)^2 dx = \dots + c$

A. $\frac{x^4}{4} + \frac{x^2}{2}$ B. $\frac{x^6}{6} + \frac{x^4}{4} + \frac{x^2}{2}$

C. $\frac{x^5}{5} + \frac{2x^3}{3} + x$ D. $\frac{x^6}{6} + \frac{x^4}{2} + \frac{x^2}{2}$

Student Workspace

Lesson 5.6

Integration by Substitution

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Unit 5 - Term 3

5 $\int \cos^4 x \sin x dx = \dots + c$

A. $\frac{\cos^5 x}{5}$ B. $-\frac{\cos^5 x}{5}$

C. $\frac{\sin^5 x}{5}$ D. $-\frac{\sin^5 x}{5}$

Student Workspace

7 $\int 4xe^{-x^2} dx = \dots + c$

A. $2x^2e^{-x^3/3}$ B. $-2e^{-x^3/3}$

C. $2x^2e^{-x^2}$ D. $-2e^{-x^2}$

Student Workspace

6 $\int \frac{x^3}{1+x^8} dx = \dots + c$

A. $\frac{1}{4}\tan^{-1}(x^4)$ B. $\frac{1}{4}\tan^{-1}(x^2)$

C. $4\tan^{-1}(x^2)$ D. $4\tan^{-1}(x^4)$

Student Workspace

8 $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx = \dots + c$

A. $-2\sin \sqrt{x}$ B. $-2\cos \sqrt{x}$

C. $2\cos \sqrt{x}$ D. $2\sin \sqrt{x}$

Student Workspace

Lesson 5.6

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Unit 5 - Term 3

9 $\int \sin^3 x \cos x dx = \dots + c$

A. $-\frac{\sin^4 x}{4}$ B. $\frac{\sin^4 x}{4}$

C. $\frac{\cos^4 x}{4}$ D. $3\sin^2 x \cos x$

Student Workspace

11 $\int_0^1 \frac{x}{\sqrt{4-x^2}} dx = \dots$

A. $2 - \cos\left(\frac{\pi}{6}\right)$ B. $2 + \cos\left(\frac{\pi}{6}\right)$

C. $-2 + 2\sin\left(\frac{\pi}{3}\right)$ D. $2 - 2\sin\left(\frac{\pi}{3}\right)$

Student Workspace

10 $\int \frac{\ln x}{x} dx = \dots + c$

A. $\ln x$ B. $\frac{1}{x^2}$

C. $\frac{1}{2}(\ln x)^2$ D. $\frac{1}{x}$

Student Workspace

12 $\int m \sin(mx) dx = \dots + c$

A. $-\cos(mx)$ B. $\cos(mx)$

C. $-\sin(mx)$ D. $\frac{1}{m}\cos(mx)$

Student Workspace

Lesson 5.6

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Unit 5 - Term 3

13 $\int \frac{1}{x^2} \cos\left(\frac{1}{x}\right) dx = \dots + c$

A. $-\sin\left(\frac{1}{x^2}\right)$ **B.** $-\sin\left(\frac{1}{x}\right)$

C. $\sin\left(\frac{1}{x}\right)$ **D.** $\sin\left(\frac{1}{x^2}\right)$

Student Workspace

14 $\int e^{5x} dx = \dots + c$

A. $5e^{5x}$ **B.** $\frac{1}{5}e^x$

C. e^{5x} **D.** $\frac{1}{5}e^{5x}$

Student Workspace

15 $\int \frac{2x}{x^2+1} dx = \dots + c$

A. $\frac{1}{2}\ln(x^2+1)$ **B.** $\ln(x^2+1)$

C. $\ln(2x)$ **D.** $2\ln(x^2+1)$

Student Workspace

16 $\int \sin(3x) dx = \dots + c$

A. $\frac{1}{3}\cos(3x)$ **B.** $3\cos(3x)$

C. $-\frac{1}{3}\cos(3x)$ **D.** $-3\cos(3x)$

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Integration by Substitution

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Unit 5 - Term 3

17 $\int \sec^2(2x) dx = \dots + c$

A. $\frac{1}{2}\tan(2x)$ **B.** $2\tan(2x)$

C. $\tan(2x)$ **D.** $\frac{1}{2}\sec(2x)$

Student Workspace

18 $\int \frac{e^x}{e^x+1} dx = \dots + c$

A. $\ln(e^x+1)$ **B.** $\frac{1}{e^x+1}$

C. $e^x \ln(e^x+1)$ **D.** e^x+1

Student Workspace

19 $\int x \cos(x^2) dx = \dots + c$

A. $-\frac{1}{2}\sin(x^2)$ **B.** $2\sin(x^2)$

C. $\frac{1}{2}\sin(x^2)$ **D.** $\sin(x^2)$

Student Workspace

20 $\int (2x+1)^3 dx = \dots + c$

A. $\frac{(2x+1)^3}{3}$ **B.** $\frac{(2x+1)^4}{8}$

C. $\frac{(2x+1)^4}{4}$ **D.** $\frac{(2x+1)^4}{2}$

Student Workspace