# أسئلة سنوات

سكند

## لجنة سنافر البوليتكنك - بسواعدنا نبنيها

اسم المادة

# التفاضل والتكامل 101

بسواعدنا نبنيها

تواصل معنا

Al Balqa' Applied University

Faculty of Engineering Technology

Applied Science Department

Calculus 1 second exam

16

**Name:** **Instructor:**

**Student Number:** **Lecture time:** **Date:9/12/2013**

CHOOSE THE CORRECT ANSWER FOR QUESTIONS (1-10) AND COMPLETE THE FOLLOWING TABLE

| Q(1) | Q(2) | Q(3) | Q(4) | Q(5) | Q(6) | Q(7) | Q(8) | Q(9) | Q(10) |
|---|---|---|---|---|---|---|---|---|---|
| d | a | c | a | d | a | b | a | d | c |

**Q(1) if** $y = (\sinh x)^{2\sinh x}$**, then** $\frac{dy}{dx} =$

4

a) $(\sinh x)^{2\sinh x}\left[1+\ln(\sinh x)\right]\cosh x$

b) $2(\sinh x)^{2\sinh x}\left[1+\ln(\sinh x)\right]\sinh x$

c) $2(\sinh x)^{2\sinh x}\left[1+\ln(\cosh x)\right]\sinh x$

d) $2(\sinh x)^{2\sinh x}\left[1+\ln(\sinh x)\right]\cosh x$

**Q(2) Let** $f(x) = 2\tan^{-1}x$**, then** $f$ **concave up on the interval**

a) $(-\infty, 0)$

b) $(0, \infty)$

c) $(-\infty, \infty)$

d) $(-\infty, 1)$

**Q(3) Let** $f(x) = 2\cos x + \cos^2 x,\ 0 \le x \le 2\pi$**, then** $f$ **increasing on the interval**

a) $\left(\frac{\pi}{2}, \pi\right)$

b) $\left(0, \frac{\pi}{2}\right)$

c) $(0, \pi)$

d) $(\pi, 2\pi)$

**Q(4) A function** $f(x) = x^3 + cx^2 + x$ **have maximum and minimum points if**

a) $c \succ \sqrt{3},\ c \prec -\sqrt{3}$

b) $c \succ \sqrt{6},\ c \prec -\sqrt{6}$

c) $c \succ 3,\ c \prec -3$

d) $c \succ \sqrt{12},\ c \prec -\sqrt{12}$

**Q(5)** $\lim\limits_{x\to 0}\dfrac{1}{x}\cdot\displaystyle\int_0^x (1-\tan t)^{\frac{1}{t}}\,dt =$

a) $e^{-4}$

b) $e^{-3}$

c) $e^{-2}$

d) $e^{-1}$

**Q(6)** $\displaystyle\int \frac{1+x}{1+x^2}\,dx =$

a) $\tan^{-1}x + \frac{1}{2}\ln|1+x^2| + c$

b) $2\tan^{-1}x + \frac{1}{2}\ln|1+x^2| + c$

c) $3\tan^{-1}x + \frac{1}{2}\ln|1+x^2| + c$

d) $4\tan^{-1}x + \frac{1}{2}\ln|1+x^2| + c$

**Q(7)** $\displaystyle\int (\sin^{-1}x)^2\,dx =$

a) $3x(\sin^{-1}x)^2 + 6\sqrt{1-x^2}\sin^{-1}x - 6x + c$

b) $x(\sin^{-1}x)^2 + 2\sqrt{1-x^2}\sin^{-1}x - 2x + c$

c) $4x(\sin^{-1}x)^2 + 8\sqrt{1-x^2}\sin^{-1}x - 8x + c$

d) $2x(\sin^{-1}x)^2 + 4\sqrt{1-x^2}\sin^{-1}x - 4x + c$

**Q(8) If** $f(x) = \displaystyle\int_0^{g(x)} \frac{1}{\sqrt{1+t^3}}\,dt$, **where** $g(x) = \displaystyle\int_0^{\cos x} (1+\sin(t^2))\,dt$, **then** $f'(\frac{\pi}{2}) =$

a) $-1$

b) $-2$

c) $2$

d) $1$

صحيح مو؟

**Q(9) If** $n$ **is a positive integer, then** $\displaystyle\int_0^n (5+[x])\,dx =$

a) $5n + \dfrac{n(n+1)}{2}$

b) $5n + \dfrac{2n+1}{2}$

c) $5n + \dfrac{n}{2}$

d) $5n + \dfrac{n(n-1)}{2}$

**Q(10) If** $\displaystyle\int_0^4 e^{(x-2)^4}\,dx = k$, **then** $\displaystyle\int_0^4 x e^{(x-2)^4}\,dx =$

a) $2k$

b) $4k$

c) $6k$

d) $8k$

$\frac{2}{20}$

Al Balqa' Applied University

Faculty of Engineering Technology

Applied Science Department

Math 101 Second Exam

Name:

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Date:6/12/2012

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**COMPLETE THE FOLLOWING ANSWER FOR QUESTIONS (1-10)**

For questions (1-3), let $f(x) = \int_0^{\pi} \cos t \cos(x-t)dt,\ 0 \le x \le 2\pi$, then

Q(1) $f$ is decreasing on $\boxed{\sin x^2\ 2\pi + c}$

Q(2) $f$ concave up on $\boxed{[2\pi, 0]}$

Q(3) $f$ has inflection point(s) at $x = \boxed{1,\ 1\pi}$

Q(4) If $f(x) = x^4 + cx^3 + x^2$ has two critical points, then the value(s) of c are

$\boxed{\cancel{2\pi\ 2}\ \frac{\pi}{2}, \frac{2\pi}{2}}$

Q(5) $\int_{-\pi}^{\pi} \frac{x^2 + \cos x}{x^3 + x} dx = \boxed{-2(\pi)^5 + \sin x}$

Q(6) If $\int_5^0 f(x)dx = 4$, then $\int_2^3 xf(x^2-4)dx = \boxed{-4}$

Q(7) $\int \frac{2x + \tan^{-1} x}{x^2 + 1} = \boxed{x^2 + \sec^2 x - \frac{2x^3}{2} + c}$

**Q(8)** $\int x\, 7^x dx =$ $\boxed{x^7 7 - (\cancel{x} 7^x = x^7 - 7^x}$

**Q(9)** $\int \sin^5 x dx =$ $\boxed{\frac{1}{4} x + (\cos 2x + \frac{1}{2}) + c}$

**Q(10)** $\int_{e^{-6}}^{e^{6}} \frac{\sqrt{36 - (\ln x)^2}}{x} dx =$ $\boxed{16}$

Q(1) $\int_{\sqrt{e}}^{e} x^{-2}\ln(x)dx = ?$

$(a)\ \frac{3\sqrt{e}+4}{2e}$ $(b)\ \frac{3\sqrt{e}-4}{2e}$ $(c)\ -\frac{3\sqrt{e}+4}{2e}$ $(d)\ \frac{4-3\sqrt{e}}{2e}$

---

Q(2) The partial fraction decomposition of $f(x)=\frac{1}{9x^3-3x^2+3x-1}$ is

$(a)\ \frac{1}{4}\left(\frac{3}{3x-1}+\frac{3x-1}{3x^2+1}\right)$ $(b)\ \frac{1}{4}\left(\frac{3}{3x-1}-\frac{3x-1}{3x^2+1}\right)$

$(c)\ \frac{1}{4}\left(\frac{3}{3x-1}-\frac{3x+1}{3x^2+1}\right)$ $(d)\ \frac{1}{4}\left(\frac{3}{3x+1}-\frac{3x+1}{3x^2+1}\right)$

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Q(3) $\int\sqrt{3-x^2-2x}dx = ?$ , let x+1=2sinu

$(a)\ 2u+2\sin(u)\cos(u)+c$ $(b)\ 2u-2\sin(u)\cos(u)+c$

$(c)\ -2u+\sin(2u)+c$ $(d)\ 2u-\sin(2u)$

---

Q(4) $\int \mathrm{sech}(6x+7)dx = ?$

$(a)\ \frac{1}{3}\tan^{-1}(6x+7)$ $(b)\ -\frac{1}{3}\tan^{-1}(6x+7)+c$ $(c)\ \frac{1}{3}\tan^{-1}(6x+7)+c$ $(d)\ \frac{1}{3}\tan^{-1}(6x+7)$

---

Q(5) $\int\sqrt{\cot(2x)}\csc(2x)dx = ?$

(a) $\frac{1}{3}\cot^{\frac{3}{2}}(2x)-\frac{1}{7}\cot^{\frac{7}{2}}(2x)+c$ $(b)\ -\frac{1}{3}\cot^{\frac{3}{2}}(2x)-\frac{1}{7}\cot^{\frac{7}{2}}(2x)+c$

$(c)\ \frac{1}{3}\cot^{\frac{3}{2}}(2x)+\frac{1}{7}\cot^{\frac{7}{2}}(2x)+c$ $(d)\ -\frac{1}{3}\cot^{\frac{3}{2}}(2x)+\frac{1}{7}\cot^{\frac{7}{2}}(2x)$

---

1

$x - 1 = \frac{1}{\cos u}$ $\quad$ $2 \tan u \sec u$

$\cos u = \frac{1}{x-1}$ $\quad$ $\sqrt{(2\sec u)^2 - 1}$

$1 + x = (x-1)^2$ $\quad$ $2 \sec u$

Q(6) $\int_0^1 \frac{1}{\sqrt[3]{e^x}} dx = ?$

(a) $3 - \frac{3}{\sqrt[3]{e}}$ (b) $3 + \frac{3}{\sqrt[3]{e}}$ (c) $\frac{3}{\sqrt[3]{e}} - 3$ (d) $-\frac{3}{\sqrt[3]{e}} - 3$ $\quad$ $\int \sec u$

---

Q(7) $f(x) = \sin(x)\cos(x), x \in [0, \pi]$ , decreasing at:

(a) $[0, \pi]$ (b) $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$ (c) $\left[0, \frac{\pi}{2}\right]$ (d) $\left[\frac{\pi}{2}, \pi\right]$

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Q(8) $f(x) = x^{\frac{1}{3}}(x - 7)^2$ has relative minimum at $x = ?$

(a) 1 (b) 0 (c) 7 (d) -1

---

Q(9) The absolute minimum of $f(x) = \sin(\cos(x))$, $x \in [0, 2\pi]$ is :

(a) sin(1) (b) cos(1) (c) - sin(1) (d) – cos(1)

---

Q(10) $\int \frac{1}{\sqrt{x}\sqrt{2-x}} dx = ?$

(a) $2\cos^{-1}\left(\sqrt{\frac{x}{2}}\right) + c$ (b) $2\sin^{-1}\left(\sqrt{\frac{x}{2}}\right) + c$

(c) $\sin^{-1}\left(\sqrt{\frac{x}{2}}\right) + c$ (d) $\cos^{-1}\left(\sqrt{\frac{x}{2}}\right) + c$

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| Q | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | b | a | | | | | c | a | c |
| symbol | b | a | a | d | c | a | b | b | b | d |

$\pm \cos(x) = \pm \sin(x)$

so $\frac{\pi}{4}$ 2 , $\frac{3\pi}{4}$

$450° \Leftarrow$ ?

$\frac{\pi}{6}$ $\quad$ $\frac{\pi}{3}$

+ + + $\quad$ - - - $\quad$ - $\quad$ + + +

$\frac{\pi}{4}$ $\quad$ $\frac{3\pi}{4}$

| الرقم التسلسلي ( ) | AL-BALQA' APPLIED UNIVERSITY<br>FACULTY OF ENGINEERING TECHNOLOGY<br>APPLIED SCIENCES DEPARTMENT | 16/20 |
|---|---|---|
| الاسم: | MATH 101 | DATE:DEC,2009 |
| المدرس: عمر بدير | SECOND EXAM | TIME: 50 Min. |

ID: A

math 1

Lecture time( 2:00 – 3:30 )

**Multiple Choice** (20 points)

*Identify the letter of the choice that best completes the statement or answers the question.*

____ 1. Given that $f(x)=x^{\frac{1}{3}}(x+4)$ then $f$ has inflection point(s)

a. only when $x=0$

b. only when $x=2$

c. when $x=0$ and $x=2$

d. when $x=0$ and $x=-2$

____ 2. The function $f(x)=x\tan^{-1}(x)$ is concave up on

a. $(-1,1)$

b. $(-\infty,0)$

c. $(0,\infty)$

d. $\mathbb{R}$

____ 3. The function $f(x)=x+\ln(2x-1)$ has

a. critical point only when $x=\frac{1}{2}$

b. critical point only when $x=-\frac{1}{2}$

c. critical points when $x=\frac{1}{2}$ and $x=-\frac{1}{2}$

d. no crtical points

____ 4. $\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}}|\sin x|\,dx=$

a. 0

b. 1

c. 2

d. $-1$

____ 5. $\int_{0}^{\ln x}2e^{2t}\,dt=$

a. $x^2-1$

b. $1-x^2$

c. $2x-1$

d. $1-2x$

~~الإجابة هي $2(x^2-1)$~~

____ 6. $\int_0^1 \frac{x^2}{\sqrt{1+x^2}}\,dx =$

a. $\int_0^{\frac{\pi}{4}} \sec(\theta)\tan^2(\theta)\,d\theta$ c. $\int_0^{\frac{\pi}{4}} \sec^2(\theta)\tan(\theta)\,d\theta$

b. $\int_0^{\frac{\pi}{2}} \sec(\theta)\tan^2(\theta)\,d\theta$ d. $\int_0^{\frac{\pi}{2}} \sec^2(\theta)\tan(\theta)\,d\theta$

____ 7. Given that $f(2)=3\,,\, f'(2)=1\,,\, f(1)=5$ *and* $f'(1)=0$ then $\int_1^2 x\, f''(x)\,dx =$

a. 1 b. 2 c. 3 d. 4

____ 8. $\int_0^1 \frac{e^x}{1+e^{2x}}\,dx =$

a. $\tan^{-1}(e)-\frac{\pi}{2}$ c. $\tan^{-1}(e^2)-\frac{\pi}{2}$

b. $\tan^{-1}(e)-\frac{\pi}{4}$ d. $\tan^{-1}(e^2)-\frac{\pi}{4}$

____ 9. Given that $\frac{1}{x^3-4x^2+4x}=\frac{A}{x}+\frac{B}{x-2}+\frac{C}{(x-2)^2}$ then the ordered triple $(A,B,C)=$

A B C

a. $(\frac{1}{4},-\frac{1}{4},\frac{1}{2})$ c. $(\frac{1}{4},\frac{1}{2},-\frac{1}{4})$

b. $(-\frac{1}{4},\frac{1}{4},\frac{1}{2})$ d. $(-\frac{1}{4},\frac{1}{2},\frac{1}{4})$

____ 10. $\int_0^{\frac{a}{\sqrt{2}}} \frac{dx}{\sqrt{a^2-x^2}} =$

a. $\frac{\pi}{6}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{2}$

1) $f(x) = x^{1/3}(x+4)$ "at the end of page."

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2.) $f(x) = x\tan^{-1}(x)$ ; where does it concave up?

$$f'(x) = x \cdot \left[\frac{1}{1+x^2}\right] + \tan^{-1}(x) \cdot (1)$$

$$f''(x) = \frac{(1+x^2)(1) - x(2x)}{(1+x^2)^2} + \frac{1}{1+x^2}$$

$$= \frac{1-x^2}{(1+x^2)^2} + \frac{1\,(1+x^2)}{1+x^2(1+x^2)}$$

$$= \frac{1-\cancel{x^2}+1+\cancel{x^2}}{(1+x^2)^2} = \frac{2}{(1+x^2)^2}$$

now; $f''(x) = 0 \Rightarrow \dfrac{2}{(1+x^2)^2} = 0 \Rightarrow 2 = 0$ it is impossible

So; we don't have any inflection point(s) to know where "$f$" is concave up ; So; The answer is

R d.

③ $f(x) = x + \ln(2x-1)$

$$f'(x) = 1 + \frac{2}{2x-1} = 0$$

$$\Rightarrow \frac{2}{2x-1} = -1 \Rightarrow 2 = 1 - 2x$$

$$1 = -2x$$

$$\boxed{x = -\tfrac{1}{2}}$$ rejected *

* Bec. "$x = -\frac{1}{2}$" is from zeros of $\ln(2x-1)$ so;

Answer should be (d.) no critical point(s).

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④ $\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} |\sin x| \, dx$ : Use Scientifice Calculater then you find the answer which is (c.) 2

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⑤ $\int_0^{\ln x} 2e^{2t} dt \Rightarrow 2\int_0^{\ln x} e^{2t} dt = 2 \cdot \frac{1}{2} e^{2t} \Big]_0^{\ln x} = x^2 - 1 =$ (a.)

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⑥ $\int_0 \frac{x^2}{\sqrt{1+x^2}} dx = 0.266$ (Numericaly) then find the other $\underline{4}$ Alternatives by using "CAS" too. You will find that the Answer is (a.) $\int_0^{\pi/4} \sec(\theta)\tan^2(\theta) d\theta$

we can solve it by using trigonometric sub.

7. $\int_1^2 \underbrace{x}_{u} \underbrace{f''(x)\,dx}_{dv} \Rightarrow$ $u = x$ $\quad dv = f''(x)\,dx$

$du = dx$ $\quad v = f'(x)$

$= x f'(x) - \underbrace{\int_1^2 f'(x)\,dx}_{}$

$= x f'(x)\Big]_1^2 - f(x)\Big]_1^2 \Rightarrow$ by substitution we find that the answer is

d. 4

---

8. $\int_0^1 \frac{e^x}{1+e^{2x}}\,dx$ can be written as $\int_0^1 \frac{e^x}{1+(e^x)^2}$

$\equiv \int_0^1 \frac{u}{1+u^2} = \boxed{\tan^{-1}(e) - \frac{\pi}{4}}$ b.

---

9. $\frac{A}{x} + \frac{B}{x-2} + \frac{C}{(x-2)^2}$ find the triple $(A, B, C)$

$\Rightarrow \frac{A(x)(x-2)(x-2)^2}{\cancel{x}} + \frac{B(x)\cancel{(x-2)}(x-2)^2}{\cancel{x-2}} + \frac{C(x)(x-2)\cancel{(x-2)}}{\cancel{(x-2)^2}}$

$= A(x-2)^3 + B(x-2)^2(x) + C(x)(x-2) = 1$ then subsitute

$x = 0$
$x = 1$

Review Partial Fraction

7. $\int_{1}^{2} \underbrace{x}_{u} \underbrace{f''(x)\,dx}_{dv} \Rightarrow \quad u = x \qquad dv = f''(x)\,dx$

$du = dx \qquad v = f'(x)$

$= x f'(x) - \int_{1}^{2} f'(x)\,dx$

$= x f'(x)\Big]_{1}^{2} - f(x)\Big]_{1}^{2} \Rightarrow$ by substitution we find that the answer is

d. 4

---

8. $\int_{0}^{1} \frac{e^x}{1+e^{2x}}\,dx$ can be written as $\int_{0}^{1} \frac{e^x}{1+(e^x)^2}$

$= \int_{0}^{1} \frac{u}{1+u^2} = \boxed{\tan^{-1}(e) - \frac{\pi}{4}}$ b.

---

9. $\frac{A}{x} + \frac{B}{x-2} + \frac{C}{(x-2)^2}$ find the triple $(A, B, C)$

$\Rightarrow \frac{A(x)(x-2)(x-2)^2}{\cancel{x}} + \frac{B(x)\cancel{(x-2)}(x-2)^2}{\cancel{x-2}} + \frac{C(x)(x-2)\cancel{(x-2)}}{\cancel{(x-2)^2}}$

$= A(x-2)^3 + B(x-2)^2\cancel{(x)} + C(x)(x-2) = 1$ then subsitute

$x = 0$
$x = 1$

Review partial fraction lesson

10.) $\int_0^{\frac{a}{\sqrt{2}}} \frac{dx}{\sqrt{a^2-x^2}} \equiv \int_0^{\frac{1}{\sqrt{2}}} \frac{dx}{\sqrt{(1)^2-x^2}} = \frac{\pi}{4}$

By Using "CAS" You can get access to the correct Choice bet. Choices You have In exam.

End