جامعة الملك عبدالعزيز.

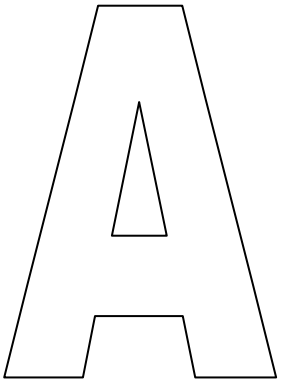
كلية العلوم. الاسم:_____

قسم الرياضيات. الرقم الجامعي:_____

math 202.
Calculus 2.

Final Exam

Date: Monday 30 / 6 / 1433 H.
Time: from 08:00 to 10:00.

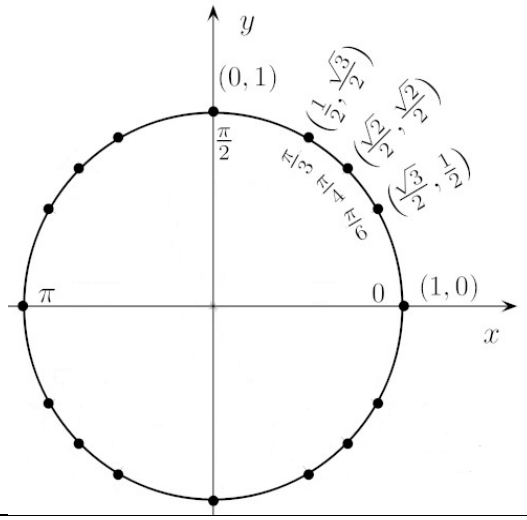


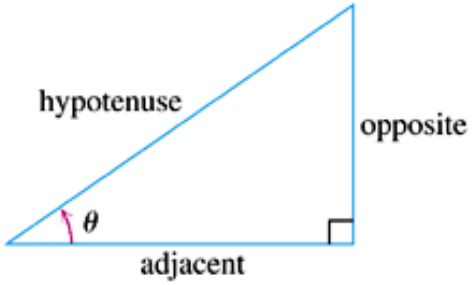
- تأكد من أن رمز نموذج الإجابة لديك هو A .
- أكتب اسمك على هذا النموذج ثم تأكد من تعبئة جميع بيانات نموذج الإجابة **خاصة رقمك الجامعي و بقلم الرصاص.**
- تأكد من تعبئة نموذج الحضور بصورة صحيحة.
- أجب عن جميع الأسئلة الآتية بتظليل الخيار الصحيح في نموذج الإجابة **بقلم الرصاص**.
- ممنوع استخدام الآلة الحاسبة.

A

هذه الصفحة تتضمن بعض القوانين التي قد تحتاجها لحل بعض أسئلة هذا الامتحان.

The Unit Circle





$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \csc\theta = \frac{\text{hyp}}{\text{opp}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \sec\theta = \frac{\text{hyp}}{\text{adj}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \qquad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$\sin^2\theta = \frac{1}{2}(1 - \cos 2\theta)$$

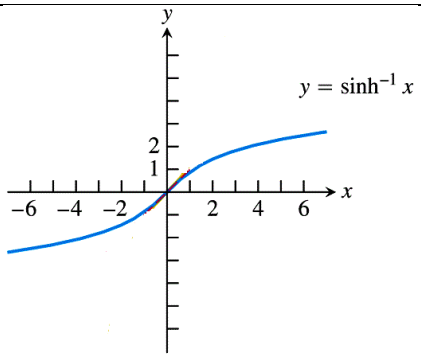
$$\frac{d}{dx}(a^x) = a^x \cdot \ln a$$

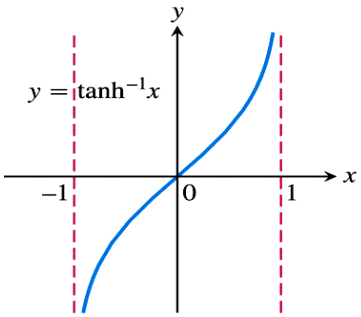
$$\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$$

$$\sinh x = \frac{1}{2}(e^x - e^{-x})$$

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





$$\int \sin^n x dx = -\tfrac{1}{n}\cos x\ \sin^{n-1}x + \tfrac{n-1}{n}\int \sin^{n-2}x\ dx \quad \text{where } n \in \mathbb{Z}, n \geq 2$$

$$\int \cos^n x dx = \tfrac{1}{n}\sin x\ \cos^{n-1}x + \tfrac{n-1}{n}\int \cos^{n-2}x\ dx \quad \text{where } n \in \mathbb{Z}, n \geq 2$$

$$\int \frac{u\,du}{(a+bu)^2} = \frac{a}{b^2(a+bu)} + \frac{1}{b^2}\ln|a+bu| + C$$

$$\int \frac{du}{u(a+bu)^2} = \frac{1}{a(a+bu)} - \frac{1}{a^2}\ln\left|\frac{a+bu}{u}\right| + C$$

A

Q1. $\sinh(-x) = -\sinh x$	
(A) TRUE	(B) FALSE

Q2. The domain of the function $f(x) = \tanh x$ is $(-\infty, 0) \cup (0, \infty)$.	
(A) TRUE	(B) FALSE

Q3. An antiderivative of $f(x) = \sqrt[5]{x^3}$ is $F(x) = \frac{5}{8}\sqrt[5]{x^8}$.	
(A) TRUE	(B) FALSE

Q4. Example 1, page A34. $1 + 2 + 4 + 8 + 16 + 32 =$				
(A) $\sum_{i=1}^{5} 2^i$	(B) $\sum_{i=0}^{5} \left(\frac{1}{2}\right)^i$	(C) $\sum_{i=0}^{5} 2^i$	(D) $\sum_{i=1}^{6} 2^i$	(E) $\sum_{i=0}^{5} 2i$

Q5. If $g(x) \geq 0$ for each $x \in [a, b]$, then the definite integral $\int_a^b g(x)dx$ means the area of the region under the graph of g and the x-axis from the vertical line $x = a$ to the vertical line $x = b$.	
(A) TRUE	(B) FALSE

Q6. If $\int_1^3 f(x)dx = -2$ and $\int_1^3 g(x)dx = 4$, then $\int_1^3 [g(x) - 3f(x) + 5]\,dx =$				
(A) 21	(B) -18	(C) 18	(D) 24	(E) 20

Q7.

$$\int_{-\pi}^{\pi} \sin x \; dx \; \leq 2\pi$$

(A) TRUE	(B) FALSE

Q8. Problem 8, page 388.

If $g(x) = \int_1^x \ln t \; dt$, then $g'(x) =$

(A)	(B)	(C)	(D)
$\frac{\ln x}{2} + x$	$x + \ln x$	$\ln t + C$	$\ln x$

Q9.

$$\int_{-\frac{1}{2}}^{\frac{1}{2}} \tanh^{-1} x \; dx \; = 2 \int_{0}^{\frac{1}{2}} \tanh^{-1} x \; dx$$

(A) TRUE	(B) FALSE

Q10. Example 7, page 404

$$\int_0^3 \sqrt{2x+3} \; dx =$$

(A)	(B)	(C)	(D)	(E)
$\frac{14}{3}$	$\frac{17}{3}$	$\frac{20}{3}$	$\frac{23}{3}$	$\frac{26}{3}$

Q11.

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

(A)	(B)	(C)
$x^3 + \frac{2}{\sqrt{x}} + \frac{x^2}{2} + C$	$x^3 + \frac{2}{\sqrt{x}} + \ln\lvert x\rvert + C$	$x^3 + 2\sqrt{x} + \ln\lvert x\rvert + C$
(D)	(E)	
$3x^3 + \frac{2}{\sqrt{x}} + \frac{x^2}{2} + C$	$3x^3 + \frac{2}{\sqrt{x}} + \ln\lvert x\rvert + C$	

A

Q12. $\int \csc(2x)\ \cot(2x)\, dx =$			
(A) $\frac{-\csc(2x)}{2} + C$	(B) $-\csc(2x + C)$	(C) $\frac{\csc(2x)}{2} + C$	(D) $\csc(2x) + C$

Q13. $\int (3^x + 3)\, dx =$			
(A) $3^x + 3x + C$	(B) $3^x \ln 3 + 3x + C$	(C) $\frac{3^x}{\ln 3} + 3 + C$	(D) $\frac{3^x}{\ln 3} + 3x + C$

Q14. $\int \sin^{-1} x\ dx =$ Problem 10, page 457 Hint: $u = \sin^{-1} x$ and $dv = dx$		
(A) $x \sin^{-1} x + \sqrt{1 + x^2} + C$	(B) $x \sin^{-1} x - \sqrt{1 - x^2} + C$	(C) $x \sin^{-1} x + \sqrt{1 - x^2} + C$
(D) $x \sin^{-1} x - \sqrt{1 + x^2} + C$	(E) $x \sin^{-1} x + \frac{1}{2}\sqrt{1 + x^2} + C$	

السؤال رقم 15 هو تكرار للسؤال رقم 14 و يجب أن تجيب عليه للحصول على درجته

Q15. $\int \sin^{-1} x\ dx =$		
(A) $x \sin^{-1} x + \sqrt{1 + x^2} + C$	(B) $x \sin^{-1} x - \sqrt{1 - x^2} + C$	(C) $x \sin^{-1} x + \sqrt{1 - x^2} + C$
(D) $x \sin^{-1} x - \sqrt{1 + x^2} + C$	(E) $x \sin^{-1} x + \frac{1}{2}\sqrt{1 + x^2} + C$	

Q16.

$$\int \sin^{13}x \ dx =$$

Hint: Use a suitable formula from the second page.

(A) $\frac{1}{13}\sin x \cos^{12}x + \frac{12}{13}\int \cos^{11}x \ dx$

(B) $-\frac{1}{13}\sin x \cos^{12}x + \frac{12}{13}\int \cos^{11}x \ dx$

(C) $\frac{1}{13}\cos x \sin^{12}x + \frac{12}{13}\int \sin^{11}x \ dx$

(D) $-\frac{1}{13}\cos x \sin^{12}x + \frac{12}{13}\int \sin^{11}x \ dx$

Q17.

$$\int \frac{x \ dx}{(2+3x)^2} =$$

Hint: Use a suitable formula from the second page.

(A) $\frac{2}{9(2+3x)} + \frac{1}{9}\ln|2+3x| + C$

(B) $\frac{2}{(2+3x)} + \frac{1}{9}\ln|2+3x| + C$

(C) $\frac{2}{9(2+3x)} + \ln|2+3x| + C$

(D) $\frac{2}{9(2+3x)^2} + \frac{1}{9}\ln|2+3x| + C$

Q18. Problem 4, page 481.

The form of the partial fraction decomposition of $\frac{2x+1}{(x+1)^3(x^2+4)^2}$ is

(A) $\frac{A}{(x+1)^2} + \frac{Bx+C}{(x^2+4)^3}$

(B) $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{(x+1)^3} + \frac{D}{x^2+4} + \frac{E}{(x^2+4)^2}$

(C) $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{x^2+4} + \frac{Ex+F}{(x^2+4)^2} + \frac{Gx+H}{(x^2+4)^3}$

(D) $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{(x+1)^3} + \frac{Dx+E}{x^2+4} + \frac{Fx+G}{(x^2+4)^2}$

السؤال رقم 19 هو تكرار للسؤال رقم 18 و يجب أن تجيب عليه للحصول على درجته

Q19.

The form of the partial fraction decomposition of $\frac{2x+1}{(x+1)^3(x^2+4)^2}$ is

(A) $\frac{A}{(x+1)^2} + \frac{Bx+C}{(x^2+4)^3}$

(B) $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{(x+1)^3} + \frac{D}{x^2+4} + \frac{E}{(x^2+4)^2}$

(C) $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{x^2+4} + \frac{Ex+F}{(x^2+4)^2} + \frac{Gx+H}{(x^2+4)^3}$

(D) $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{(x+1)^3} + \frac{Dx+E}{x^2+4} + \frac{Fx+G}{(x^2+4)^2}$

Q20. Problem 9, page 481 $\int \frac{x-9}{x^2+3x-10}\,dx =$	
(A) $2\ln\|x-5\| - \ln\|x+2\| + C$	(B) $2\ln\|x+5\| - \ln\|x-2\| + C$
(C) $\ln\|x-5\| - 2\ln\|x+2\| + C$	(D) $\ln\|x+5\| - 2\ln\|x-2\| + C$

السؤال رقم 21 هو تكرار للسؤال رقم 20 و يجب أن تجيب عليه للحصول على درجته

Q21. $\int \frac{x-9}{x^2+3x-10}\,dx =$	
(A) $2\ln\|x-5\| - \ln\|x+2\| + C$	(B) $2\ln\|x+5\| - \ln\|x-2\| + C$
(C) $\ln\|x-5\| - 2\ln\|x+2\| + C$	(D) $\ln\|x+5\| - 2\ln\|x-2\| + C$

Q22. Problem 1, page 465 $\int \sin^2 x\ \cos^3 x\,dx =$	
(A) $\frac{\sin^5 x}{5} - \frac{\sin^3 x}{3} + C$	(B) $\frac{\cos^3 x}{3} - \frac{\cos^5 x}{5} + C$
(C) $\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + C$	(D) $\frac{\cos^5 x}{5} - \frac{\cos^3 x}{3} + C$

السؤال رقم 23 هو تكرار للسؤال رقم 22 و يجب أن تجيب عليه للحصول على درجته

Q23. $\int \sin^2 x \cos^3 x \, dx =$	
(A) $\frac{\sin^5 x}{5} - \frac{\sin^3 x}{3} + C$	(B) $\frac{\cos^3 x}{3} - \frac{\cos^5 x}{5} + C$
(C) $\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + C$	(D) $\frac{\cos^5 x}{5} - \frac{\cos^3 x}{3} + C$

Q24. Example 7, page 464 $\int \tan^3 x \, dx =$	
(A) $\frac{\tan^2 x}{2} - \ln\lvert\sec x\rvert + C$	(B) $\frac{\tan^2 x}{2} - \ln\lvert\csc x\rvert + C$
(C) $\tan^2 x - \ln\lvert\sec x\rvert + C$	(D) $\frac{\tan^4 x}{4} + C$

السؤال رقم 25 هو تكرار للسؤال رقم 24 و يجب أن تجيب عليه للحصول على درجته

Q25. Example 7, page 464 $\int \tan^3 x \, dx =$	
(A) $\frac{\tan^2 x}{2} - \ln\lvert\sec x\rvert + C$	(B) $\frac{\tan^2 x}{2} - \ln\lvert\csc x\rvert + C$
(C) $\tan^2 x - \ln\lvert\sec x\rvert + C$	(D) $\frac{\tan^4 x}{4} + C$

A

Q26. Problem 13, page 472

$$\int \frac{\sqrt{x^2-9}}{x^3}\,dx =$$

(A) $\frac{1}{4}\sin^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{x^2} + C$

(B) $\frac{1}{2}\tan^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{2x^2} + C$

(C) $\frac{1}{6}\sec^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{2x^2} + C$

(D) $\frac{1}{6}\tan^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{2x^2} + C$

السؤال رقم 27 هو تكرار للسؤال رقم 26 و يجب أن تجيب عليه للحصول على درجته

Q27.

$$\int \frac{\sqrt{x^2-9}}{x^3}\,dx =$$

(A) $\frac{1}{4}\sin^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{x^2} + C$

(B) $\frac{1}{2}\tan^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{2x^2} + C$

(C) $\frac{1}{6}\sec^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{2x^2} + C$

(D) $\frac{1}{6}\tan^{-1}\left(\frac{x}{3}\right) - \frac{\sqrt{x^2-9}}{2x^2} + C$

Q28.

If $f(x)$ is continuous on $[3, \infty)$, then $\int_3^{\infty} f(x)dx =$

(A) $\lim_{b\to-\infty} \int_b^3 f(x)dx$

(B) $\lim_{b\to\infty} \int_3^b f(x)dx$

(C) $\lim_{b\to3^-} \int_3^b f(x)dx$

(D) $\lim_{b\to3^+} \int_3^b f(x)dx$

Q29.

$$\int_1^{\infty} \frac{1}{x^{\frac{\pi}{2}}}\, dx$$ is

(A) convergent	(B) divergent
(C) neither convergent nor divergent	

Q30. example 5, page 512

$$\int_2^5 \frac{1}{\sqrt{x-2}}\, dx$$

(A) diverges	(B) converges to $\sqrt{3}$
(C) converges to 2	(D) converges to $2\sqrt{3}$

السؤال رقم 31 هو تكرار للسؤال رقم 30 و يجب أن تجيب عليه للحصول على درجته

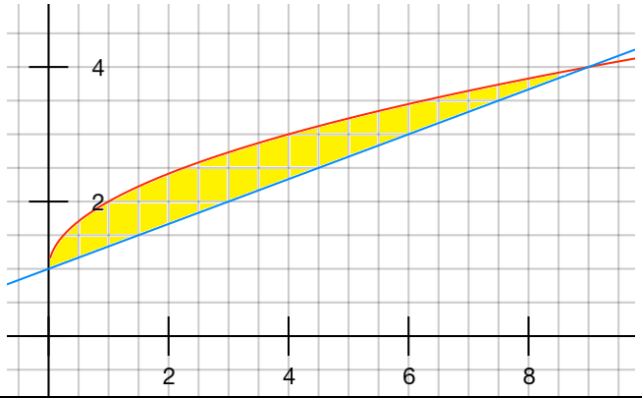
Q31.

$$\int_2^5 \frac{1}{\sqrt{x-2}}\, dx$$

(A) diverges	(B) converges to $\sqrt{3}$
(C) converges to 2	(D) converges to $2\sqrt{3}$

Q32. Problem 10, page 420.

The area of the region enclosed by the curves $y = 1 + \sqrt{x}$ and $y = \frac{3+x}{3}$, is



A

(A) $\frac{11}{2}$	(B) $\frac{9}{2}$	(C) $\frac{7}{2}$	(D) $\frac{5}{2}$	(E) $\frac{3}{2}$

السؤال رقم 33 هو تكرار للسؤال رقم 32 و يجب أن تجيب عليه للحصول على درجته

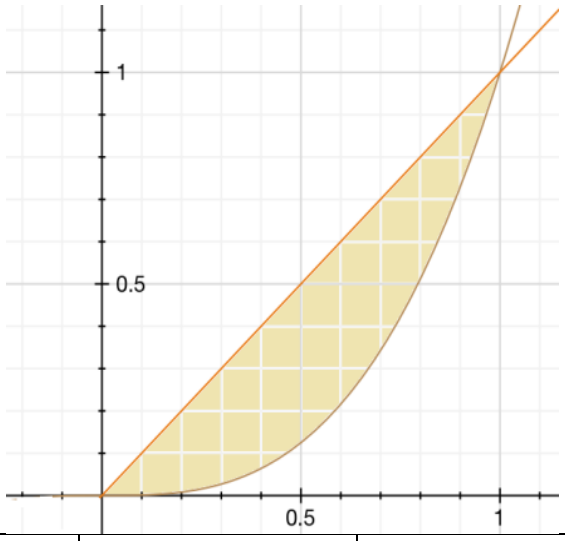
Q33.

The area of the region enclosed by the curves $y = 1 + \sqrt{x}$ and $y = \frac{3+x}{3}$, is

(A) $\frac{11}{2}$	(B) $\frac{9}{2}$	(C) $\frac{7}{2}$	(D) $\frac{5}{2}$	(E) $\frac{3}{2}$

Q34. Problem 7, page 430.

By using the Washer Method, the volume of the solid generated by rotating about the x-axis the region bounded by the curve $y = x^3$ and the lines $y = x$, where $x \geq 0$, is



(A) $\frac{61\pi}{4}$	(B) $\frac{41\pi}{4}$	(C) $\frac{4\pi}{21}$	(D) $\frac{2\pi}{21}$	(E) $\frac{21\pi}{4}$

السؤال رقم 35 هو تكرار للسؤال رقم 34 و يجب أن تجيب عليه للحصول على درجته

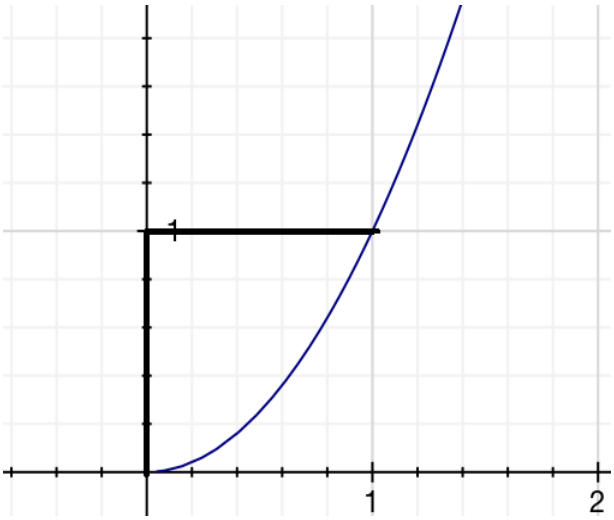
Q35.

By using the Washer Method, the volume of the solid generated by rotating about the x-axis the region bounded by the curve $y = x^3$ and the lines $y = x$, where $x \geq 0$, is

(A) $\frac{61\pi}{4}$	(B) $\frac{41\pi}{4}$	(C) $\frac{4\pi}{21}$	(D) $\frac{2\pi}{21}$	(E) $\frac{21\pi}{4}$

Q36. Problem 10, page 436.

By using the Cylindrical Shell Method, the volume of the solid generated by rotating about the x-axis the region bounded by the curve $x = \sqrt{y}$ and the lines $x = 0$ and $y = 1$ is



(A)	(B)	(C)	(D)	(E)
$\frac{\pi}{5}$	$\frac{2\pi}{5}$	$\frac{3\pi}{5}$	$\frac{4\pi}{5}$	$\frac{6\pi}{5}$

السؤال رقم 37 هو تكرار للسؤال رقم 36 و يجب أن تجيب عليه للحصول على درجته

Q37.

By using the Cylindrical Shell Method, the volume of the solid generated by rotating about the x-axis the region bounded by the curve $x = \sqrt{y}$ and the lines $x = 0$ and $y = 1$ is

(A)	(B)	(C)	(D)	(E)
$\frac{\pi}{5}$	$\frac{2\pi}{5}$	$\frac{3\pi}{5}$	$\frac{4\pi}{5}$	$\frac{6\pi}{5}$

Q38. Problem 13, page 530.

The length of the curve $y = \ln(\sec x)$; where $0 \le x \le \frac{\pi}{4}$ is

(A)	(B)	(C)	(D)	(E)
$\ln(\sqrt{2})$	$\ln(\sqrt{2}+1)$	$\ln(1-\sqrt{2})$	$\ln(\sqrt{2}+2)$	$\ln(\sqrt{2}+3)$

السؤال رقم 39 هو تكرار للسؤال رقم 38 و يجب أن تجيب عليه للحصول على درجته

Q39. The length of the curve $y = \ln(\sec x)$; where $0 \le x \le \frac{\pi}{4}$ is				
(A) $\ln(\sqrt{2})$	(B) $\ln(\sqrt{2}+1)$	(C) $\ln(1-\sqrt{2})$	(D) $\ln(\sqrt{2}+2)$	(E) $\ln(\sqrt{2}+3)$

Q40. Problem 4, page 537. An integral for the area of the surface obtained by rotating the curve $x = \sqrt{y-y^2}$; $0 \le y \le 1$ about the y-axis is		
(A) $\int_0^1 2\pi\sqrt{y-y^2}\ \sqrt{\frac{1}{4y(y-1)}}\ dy$	(B) $\int_0^1 2\pi\sqrt{y^2-y}\ \sqrt{\frac{1}{4y(1-y)}}\ dy$	(C) $\int_0^1 2\pi\sqrt{y-y^2}\ \sqrt{\frac{1}{4y(1-y)}}\ dy$
(D) $\int_0^1 2\pi\sqrt{y-y^2}\ \sqrt{\frac{1}{y(1-y)}}\ dy$	(E) $\int_0^1 2\pi\sqrt{y-y^2}\ \sqrt{\frac{1}{y(y-1)}}\ dy$	

A

Answers to Final Exam

A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	B	A	C	A	E	A	D	B	E	C	A	D	C	C	D	A	D	D	B

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
B	C	C	A	A	C	C	B	A	D	D	B	B	C	C	D	D	B	B	C