King Saud University
Science and Medical Studies Section for girls
College of Science
Department of Mathematics

Math 111
1st Term 1432-1433H
Final Exam
3 Hours

Student's Name:	**Student ID.:**
Group No.:	**Lecturer's Name:**

Question No.	**I**	**II**	**III**	**IV**	**V**	**Total**
Mark						

QUESTION I

A. Choose the correct answer :

1. $\lim_{n\to\infty}\sum_{i=1}^{n}\frac{i^2}{n^2}$ equals

i. $\frac{1}{6}$	ii. $\frac{1}{3}$	iii. $\frac{1}{2}$	iv.None of the previous

2. $\int e^x\sqrt{\cosh(2x)-\sinh(2x)}\ dx$ is equal to

i. $\int e^x dx$	ii.0	iii. $\int 1\ dx$	iv.None of the previous

3.The partial fractions of $\frac{1}{(x^2-16)(x-4)}$ are

i. $\frac{A}{x-4}+\frac{B}{(x-4)^2}+\frac{C}{x+4}$	ii. $\frac{Ax+B}{(x-4)^2}+\frac{C}{x+4}$	iii. $\frac{Ax+B}{x^2-4}+\frac{C}{x+4}$	iv.None of the previous

4. If $\ln\left(e(x^2+1)\right)-\ln(2x)=1,$ then x is

i. $\sqrt{e}-1$	ii.1	iii. e	iv.None of the previous

5. The parametric equations $x=2\cos t,\ y=3\sin t$ represents

i.An ellipse	ii.A circle	iii.A line	iv.None of the previous

6. If $F(x)=x\int_{x}^{3}\sqrt{1+t^4}\,dt,$ then $F'(3)$ equals

i.0	ii. $-3\sqrt{82}$	iii. $3\sqrt{82}$	iv.None of the previous

7.For the polar coordinates $(r,\theta)=\left(6,\frac{\pi}{4}\right)$, the rectangular coordinates (x,y) are

i. $\left(\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}}\right)$	ii. $\left(\frac{\pi}{4}\cos 6,\frac{\pi}{4}\sin 6\right)$	iii. $\left(\frac{6}{\sqrt{2}},\frac{6}{\sqrt{2}}\right)$	iv.None of the previous

8. For the rectangular coordinates $(x,y)=(-2,4)$, the polar coordinates (r,θ) are

i. $\left(\sqrt{20},\tan^{-1}(-2)+\pi\right)$	ii $\left(-\sqrt{20},\tan^{-1}(-2)+\pi\right)$	iii. $\left(\sqrt{20},\tan^{-1}(-2)\right)$	iv.None of the previous

9.The graph of the rose $r=5\sin 4\theta$ has

i.5 leaves	ii.4 leaves	iii.8 leaves	iv.None of the previous

10. $\frac{d}{dx}(\sinh^{-1}x)$ is

i. $\frac{1}{\sqrt{1+x^2}}$	ii. $\frac{1}{\sqrt{1-x^2}}$	iii. $\frac{1}{1+x^2}$	iv.None of the previous

B. Prove that for any positive real numbers a,b

$$\ln(ab)=\ln(a)+\ln(b)$$

QUESTION II

Determine whether the following improper integrals converge or diverge

i. $\int_0^{\pi} \sec^2 x \ dx$

ii. $\int_0^{\infty} xe^{-x^2} dx$

QUESTION III

Evaluate the following integrals

1. $\int \frac{2\cos x + 3\sin x}{\sin^3 x}\, dx$

2. $\int e^{2x} \sinh x \; dx$

3. $\int \frac{\sqrt{x^2-16}}{x^2}\,dx, \;\; x>4$

4. $\int e^{-x}\ln\left(e^{2x}-1\right)dx$

QUESTION IV

1. *Sketch* and *Find the area* of the region bounded by the graphs of $y = 9 - x^2$ and $y = 3 - x$

2. Let R be the region bounded by $y = \sqrt{x}$, $x-$axis and the line $x = 4$. *Sketch R* and *set up the integral for the volume* of the solid resulting by revolving R about

i. The $x-$axis

ii. The $y-$axis.

3. Find the arc length of $f(x)=\frac{2}{3}x^{\frac{3}{2}}$ on $[0,1]$

QUESTION IV

1. *Sketch* and *find the area* of the region $r=4+2\cos\theta,$ for $0\le\theta\le 2\pi$.

2. Find the polar equation corresponding to the rectangular equation $4x\sqrt{x^2+y^2}=6y,$ $(x,y)\neq(0,0)$.

Good Luck