



Student's Name	Student's ID	Group Number	Lecturer's Name

Question Number	Grade
1	
2	
3	
4	
5	
Total Mark	

Q1. Choose the correct answer (Write it on the table below):

Question	i	ii	iii	iv	v
Answer					

i) If $f(x) = \int_2^{\sin x} (1-t^2) dt$, then $f'(x)$ equals:

- a) $\sin^3 x$ b) $\cos^2 x$ c) $\cos^3 x$ d) None of the previous

(ii) If $y = \cosh^{-1}(\coth x)$, then $\frac{dy}{dx}$ equals:

- a) $\frac{1}{\operatorname{csch} x}$ b) $\cosh x$ c) $-\operatorname{csch} x$ d) None of the previous

(iii) The polar equation $r = \frac{2}{\cos \theta}$ represents:

- a) Circle b) a straight line c) an ellipse d) None of the previous

(iv) If the (x, y) – coordinates of a point are $(2\sqrt{3}, -2)$, then its polar coordinates are:

- a) $(4, -\frac{11\pi}{6})$ b) $(4, -\frac{7\pi}{6})$ c) $(4, -\frac{\pi}{6})$ d) None of the previous

(v) If a point has a polar coordinates $(r, \theta) = (-3, \frac{5\pi}{4})$, then it has also the (r, θ) coordinates:

- a) $(-3, -\frac{3\pi}{4})$ b) $(3, \frac{7\pi}{4})$ c) $(-3, -\frac{\pi}{4})$ d) None of the previous

Q2. a)

(i) **Sketch** the region bounded by the graphs of the equations $y = x^2$, $y = 4$, $x = 0$ in the first quadrant.

(ii) Find the **volume** of the solid generated from revolving the above region about the x -axis.

b) The graph of $y = \sqrt{9 - x^2}$ from $(-2, \sqrt{5})$ to $(2, \sqrt{5})$ is revolved about the x -axis. Find the **surface area** of the resulting solid.

Q3.

- i) **Sketch** the graph of the polar equation $r = 2\cos\theta$.
- ii) Find the **area** of the region enclosed by the graph $r = 2\cos\theta$.

Q4.

- i) Find an equation in x and y that represent the graph $x = \cos t + 1$, $y = \sin t + 1$; $0 \leq t \leq \pi$
- ii) **Sketch** the graph $x = \cos t + 1$, $y = \sin t + 1$; $0 \leq t \leq \pi$ and indicate the **orientation**.

Q5. a) Evaluate the following integrals:

i)
$$\int \frac{1}{\sqrt{x^2 + 8x + 25}} dx$$

ii) $\int \sin^{-1} x \, dx$

iii) $\int \tan^3 x \sec^6 x \, dx$

iv) $\int \frac{2x^2 - 3x + 2}{x^3 + x} dx$

v) $\int \frac{1}{x^2 \sqrt{x^2 - 25}} dx$

- b) Determine whether the following improper integral is **converges or diverges** and if it converges find its value?

i) $\int_0^{\infty} 3^x dx$

ii) $\int_{-1}^0 \frac{1}{\sqrt[3]{x+1}} dx$

Good Luck

This page will not be graded