MTH 103: PRACTICE QUESTION

1.Evaluate $\int \dfrac{2x-6}{(x+3)(x-1)}dx$

2.Use first principle to differentiate $y=\sqrt{x}$

2.From first principle, find the derivative of $y=\cos 8x$.

3.From first principle, find the derivative of $y=\cos ax$.

4.From first principle, find the derivative of $y=\sin 5x$.

5.From first principle, find the derivative of $y=\sin ax$.

6.Use reduction formula to evaluate $\int \cos^7 x\, dx$

7.Use reduction formula to evaluate $\int \sin^8 x\, dx$

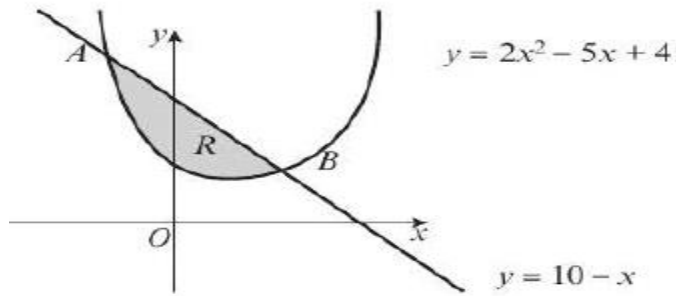8. Find $\dfrac{dy}{dx}$ if in term of x and y if $\sqrt{xy}+\sin 2x\cos 3y+8x^3-10y^2=8$

9.Use reduction formula to evaluate $\int \sin^4 x\, dx$

10. $\displaystyle\lim_{x\to\pi} \dfrac{\sqrt{1-\tan x}-\sqrt{1+\tan x}}{\sin 2x}$

11. A curve C with equation $y=\dfrac{\sin x}{e^{2x}}$, $0<x<\pi$, has a stationary point at P. Find the coordinates of P.   6marks

12. Evaluate $\int e^x \cos x\, dx$ 7marks

13. The line with equation $y=10-x$ cuts the curve with equation $y=2x^2-5x+4$ at the points A and B, as shown in the figure below

$y = 2x^2 - 5x + 4$

$y = 10 - x$

The shaded region R is bounded by the line and the curve as shown in the figure.

Find the exact area of R

14. Find the inverse of the function $y = \dfrac{2x+1}{x-3}$.

15. If $y = \ln(x + \sqrt{1+x^2})$, show that $(1+x^2)y'' + xy' = 0$.

16. Evaluate the integral $\displaystyle\int \dfrac{dx}{b^2 + a^2 x^2}$..

17. Use substitution method to evaluate the integral $\displaystyle\int \dfrac{\tan^{-1} x}{1+x^2}\,dx$.

18. if $y = f(x) = (x-1)(x-2)(x-3)$. What are the stationary points of the systems. Classify the stationary points.

19. Find the derivative of the function $y = 3x^2 \cos 5x$.

20. Evaluate $\displaystyle\int \cot x\,dx$

21. Evaluate $\displaystyle\int \dfrac{x+1}{(x-2)(x-4)}\,dx$

22. Find the derivative of $y = \ln(4x^2 - 3x + 7)$

23. Evaluate the integral $\displaystyle\int \dfrac{dx}{x^2 + 100}$.

24. If $y = \ln\left(\dfrac{2x+5}{4x+7}\right)$. Find $\dfrac{dy}{dx}$

25. Find $\lim\limits_{x \to 0}\left(\dfrac{(11+x)^2 - 121}{2x}\right)$

26. Use quotient rule to find $\dfrac{dy}{dx}$ if $y = \tan 10x$

27. Differentiate between even and odd function. Hence prove that the function $f(x) = \log\left(\dfrac{1-x}{1+x}\right)$ even or odd function?

28. Given that $y = \sin^4 x$ find $\dfrac{dy}{dx}$

29. Given that $y = \cos^4 x$ find $\dfrac{dy}{dx}$

30. Evaluate $\int\left(\sqrt{2x+7}\right)dx$

1. Find the gradient of the curve with equation $y = 3\sqrt{x}$ at the point where $x = \dfrac{9}{16}$

   A. 1
   B. 2
   C. 3
   D. 4

2. Given that $2y^2 - x^3 = 0$ and $y > 0$. Find $\dfrac{dy}{dx}$

   A. $\dfrac{3}{2}\sqrt{\dfrac{x}{2}}$

   B. $\dfrac{3}{4}\sqrt{\dfrac{x}{2}}$

   C. $\dfrac{3}{2}\sqrt{\dfrac{x}{3}}$

   D. $\dfrac{3}{2}\sqrt{\dfrac{x}{5}}$

3. Given that a is a positive constant and $\displaystyle\int_a^{3a}\left(\dfrac{2x+1}{x}\right)dx = \ln 12,$ Find the value of a

   A. $\dfrac{1}{3}\ln 3$

   B. $\dfrac{1}{4}\ln 4$

C. $\dfrac{1}{5}\ln 5$

D. $\dfrac{1}{6}\ln 6$

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

A. $\dfrac{1}{10}(2x+3)^5$

B. $\dfrac{1}{5}(2x+3)^5$

C. $\dfrac{1}{15}(2x+3)^5$

D. $\dfrac{1}{20}(2x+3)^5$

5. Find $\displaystyle\lim_{x\to 0}\left(\dfrac{(6+x)^2-36}{x}\right)$

A. 9
B. 10
C. 11
D. 12

6. Evaluate $\int x^2 \ln x\, dx$

A. $\dfrac{x^3}{9}\ln x - \dfrac{x^3}{3} + c$

B. $\dfrac{x^3}{9}\ln x + \dfrac{x^3}{3} + c$

C. $\dfrac{x^3}{3}\ln x - \dfrac{x^3}{9} + c$

D. $\dfrac{x^3}{3}\ln x + \dfrac{x^3}{9} + c$

7. Find the range of the function $y = x^2 + 2x + 3$

A. [2, ∞]
B. [2, ∞]
C. (2, ∞)
D. [2, ∞)

8. Evaluate $\int \cos^2 x\, dx$

A. $\dfrac{1}{2}\left(x + \dfrac{1}{3}\sin 2x\right) + C$

B. $\dfrac{1}{2}\left(x+\dfrac{1}{2}\cos 2x\right)+C$

C. $\dfrac{1}{2}\left(x-\dfrac{1}{4}\sin 2x\right)+C$

D. $\dfrac{1}{2}\left(x-\dfrac{1}{3}\cos 2x\right)+C$

9. Find the equation of the normal to the curve with equation $y=8-3\sqrt{x}$ at the point where $x=4$

A. $4y+3x-10=0$

B. $3y+4x-10=0$

C. $4y-3x+10=0$

D. $3y-4x+10=0$

10. Find $\dfrac{dy}{dx}$ given that $y=\dfrac{2-3e^{7x}}{4e^{3x}}$

A. $\dfrac{3}{2}e^{-3x}+3e^{4x}$

B. $\dfrac{3}{2}e^{-3x}-3e^{4x}$

C. $-\dfrac{3}{2}e^{-3x}-3e^{4x}$

D. $-\dfrac{3}{2}e^{-3x}+3e^{4x}$

11. Given that $y=\sqrt{5x^2+1}$, find $\dfrac{dy}{dx}$ at $(4,9)$

A. $-\dfrac{20}{9}$

B. $\dfrac{20}{9}$

C. $\dfrac{9}{20}$

D. $-\dfrac{9}{20}$

12. Given that $y=\dfrac{x}{2x+5}$ find $\dfrac{dy}{dx}$

A. $-\dfrac{5}{(2x+5)^2}$

B. $\dfrac{5}{(2x+5)^2}$

C. $-\dfrac{2}{(2x+5)^2}$

D. $\dfrac{2}{(2x+5)^2}$

13. Evaluate $\displaystyle\int \sin^2 x\, dx$

A. $\dfrac{1}{2}\left(x+\dfrac{1}{2}\sin 2x\right)+C$

B. $\dfrac{1}{2}\left(x+\dfrac{1}{2}\cos 2x\right)+C$

C. $\dfrac{1}{2}\left(x-\dfrac{1}{2}\sin 2x\right)+C$

D. $\dfrac{1}{2}\left(x-\dfrac{1}{2}\cos 2x\right)+C$

14. $\displaystyle\int \dfrac{2x-6}{(x+3)(x-1)}\,dx$

A. $\ln\left|\dfrac{(x+3)^3}{x-1}\right|+c$ B. $\ln\left|\dfrac{(x+1)^3}{x-1}\right|+c$ C. $\ln\left|\dfrac{(x+3)^3}{2x-1}\right|+c$ D. $\ln\left|\dfrac{(2x+3)^3}{2x-1}\right|+c$

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