MA2 Final Exam Review – Sheet 1

1. $\int_1^2 (4x^3 - 6x)\,dx =$

(A) 2
(B) 4
(C) 6
(D) 36
(E) 42

2. If $f(x) = x\sqrt{2x-3}$, then $f'(x) =$

(A) $\dfrac{3x-3}{\sqrt{2x-3}}$
(B) $\dfrac{x}{\sqrt{2x-3}}$
(C) $\dfrac{1}{\sqrt{2x-3}}$
(D) $\dfrac{-x+3}{\sqrt{2x-3}}$
(E) $\dfrac{5x-6}{2\sqrt{2x-3}}$

3. If $\int_a^b f(x)\,dx = a + 2b$, then $\int_a^b (f(x)+5)\,dx =$

(A) $a+2b+5$ (B) $5b-5a$ (C) $7b-4a$ (D) $7b-5a$ (E) $7b-6a$

4. The graph of $y = 3x^4 - 16x^3 + 24x^2 + 48$ is concave down for

(A) $x < 0$
(B) $x > 0$
(C) $x < -2$ or $x > -\dfrac{2}{3}$
(D) $x < \dfrac{2}{3}$ or $x > 2$
(E) $\dfrac{2}{3} < x < 2$

5. $\dfrac{d}{dx}\cos^2(x^3) =$

(A) $6x^2 \sin(x^3)\cos(x^3)$
(B) $6x^2 \cos(x^3)$
(C) $\sin^2(x^3)$
(D) $-6x^2 \sin(x^3)\cos(x^3)$
(E) $-2\sin(x^3)\cos(x^3)$

6. An equation of the line tangent to the graph of $y = \cos(2x)$ at $x = \dfrac{\pi}{4}$ is

(A) $y - 1 = -\left(x - \dfrac{\pi}{4}\right)$
(B) $y - 1 = -2\left(x - \dfrac{\pi}{4}\right)$
(C) $y = 2\left(x - \dfrac{\pi}{4}\right)$
(D) $y = -\left(x - \dfrac{\pi}{4}\right)$
(E) $y = -2\left(x - \dfrac{\pi}{4}\right)$

7. The area of the region enclosed by the graph of $y = x^2 + 1$ and the line $y = 5$ is

(A) $\frac{14}{3}$ (B) $\frac{16}{3}$ (C) $\frac{28}{3}$ (D) $\frac{32}{3}$ (E) 8π

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8. $\int_0^{\frac{\pi}{4}} \frac{e^{\tan x}}{\cos^2 x} dx$ is

(A) 0 (B) 1 (C) $e-1$ (D) e (E) $e+1$

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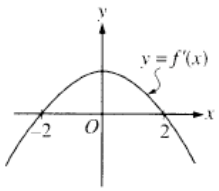
9. If $x^2 + y^2 = 25$, what is the value of $\frac{d^2y}{dx^2}$ at the point $(4,3)$?

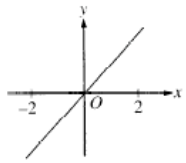
(A) $-\frac{25}{27}$ (B) $-\frac{7}{27}$ (C) $\frac{7}{27}$ (D) $\frac{3}{4}$ (E) $\frac{25}{27}$

10.

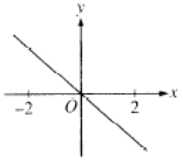


The graph of the derivative of f is shown in the figure above. Which of the following could be the graph of f?

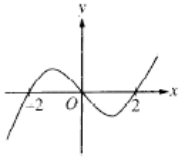
(A)



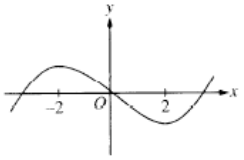
(B)



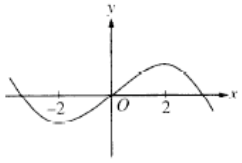
(C)



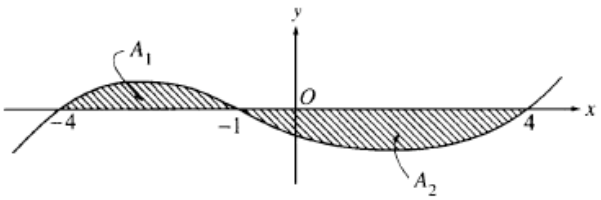
(D)



(E)



11.



The graph of $y = f(x)$ is shown in the figure above. If A_1 and A_2 are positive numbers that represent the areas of the shaded regions, then in terms of A_1 and A_2,

$\int_{-4}^{4} f(x)\,dx - 2\int_{-1}^{4} f(x)\,dx =$

(A) A_1 (B) $A_1 - A_2$ (C) $2A_1 - A_2$ (D) $A_1 + A_2$ (E) $A_1 + 2A_2$