1. The area of the region between the graph of $4x^3 + 3$ and the x-axis from x=2 to x=3 is:

A. 36
B. 68
C. 20
D. 17
E. 9

$\int_2^3 (4x^3+3)\,dx \quad x^4+3x\Big]_2^3$

$81+9-[16+6] \quad 90-22$

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2. The area of the region enclosed by the graph of $y = x^2 - 2$ and the line y=2 is:

A. 14/3
B. 16/3
C. 28/3
D. 32/3
E. 8π

$2\int_0^2 [2-(x^2-2)]\,dx \quad x^2-2=2$

$x^2-4=0$

$2\int_0^2 4-x^2 \quad 2\left[4x-\frac{1}{3}x^3\right]_0^2 \quad x=\pm 2$

$2\left(8-\frac{8}{3}\right)$

$2\left(\frac{24}{3}-\frac{8}{3}\right)$

$2\left(\frac{16}{3}\right)$

3. If $\int_1^{12} f(x)dx = 7$ and $\int_{12}^{5} f(x)dx = 2$ then $\int_1^5 f(x)dx =$

A. -3
B. 0
C. 3
D. 9
E. 11

$\int_5^{12} = -2$

$\int_1^5 + \int_5^{12} = \int_1^{12} \quad x+-2=7$

$x=9$

4. If F and f are continuous functions such that F'(x)=f(x) for all x, then $\int_a^b f(x)dx$ is:

A. F'(a) - F'(b)
B. F'(b) - F'(a)
C. F(b) -F(a)
D. F(a) - F(b)
E. none of the above

5. If $\int_{-4}^{4} (x^3+k)dx = 24$, then k =

A. -12
B. -4
C. 3
D. 4
E. 12

$\frac{1}{4}x^4+kx\Big|_{-4}^{4} = 24$

$64+4k-[64-4k]=24$

$4k+4k=24$

$8k=24$

$k=3$

6. $\int_1^3 x^{-4}\,dx =$

A. -1/3
B. 26/81
C. -26/81
D. 4/27
E. 15/16

$-\frac{1}{3}x^{-3}\Big|_1^3$

$-\frac{1}{3}\left[3^{-3}-1^{-3}\right]$ $-\frac{1}{3}\left[\frac{1}{27}-1\right]$

$-\frac{1}{3}\left[\frac{1}{27}-\frac{27}{27}\right)$

$-\frac{1}{3}\left[\frac{-26}{27}\right]$

7. $\int -\csc^2 x\,dx =$

A. tan x + C
B. cotx + C
C. $\cot^2$ x + C
D. $\frac{\sec^3 x}{3}+C$
E. $2\csc^2$ x cot x + C

8. $\int_4^5 \frac{3x^2}{x^2+1}\,dx =$

$\frac{1}{2}3$ $u=x^2+1$ $du=2x\,dx$

$\frac{3}{2}\int_{17}^{26}\frac{1}{u}\,du$

$u(4)=17$

$u(5)=26$

$\frac{3}{2}\left[\ln 26-\ln 17\right]$ $\frac{3}{2}\ln\left[\frac{26}{17}\right]$

A. $\frac{1}{2}\ln\frac{5}{4}$
B. $\frac{3}{2}\ln 3$
C. $\ln 2$
D. $2\ln 2$
E. $\frac{3}{2}\ln\frac{26}{17}$

$\frac{24}{81}$

9. $\int_0^1 (x-7)^2\,dx =$

A. -7/3
B. -7/9
C. 113/3
D. 1
E. 127/3

$\frac{1}{3}(x-7)^3\Big|_0^1$

$\frac{1}{3}\left[(-6)^3-(-7)^3\right]$

$\frac{1}{3}\left[-216+343\right]$

$\frac{1}{3}\left[127\right]$

$\frac{49}{3}$

10. $\int\left(\cos(3x+5)\right)dx =$

A. -3sin(3x+5)+C
B. -sin(3x+5)+C
C. -1/3sin(3x+5)+C
D. 1/3sin(3x+5)+C
E. sin(3x+5)+C

$\frac{1}{3}\sin(3x+5)$