1. $\displaystyle\int \frac{\cos(\ln x)}{x}\,dx =$

(a) $\sin(\ln x) + c$

(b) $\cos(\ln x) + c$

(c) $-\sin(\ln x) + c$

(d) $-\cos(\ln x) + c$

(e) $(\ln x)\sin(\ln x) + c$

2. If $\displaystyle\int_{10}^{0} f(x)\,dx = -36$ and $\displaystyle\int_{0}^{9} f(x)\,dx = 20$, then $\displaystyle\int_{9}^{10} 2f(x)\,dx =$

(a) 32

(b) 16

(c) 64

(d) -16

(e) -64

3. $f(x) = \begin{cases} 2 & \text{if} \quad -2 \le x \le 0 \\ 4 - x^2 & \text{if} \quad 0 < x \le 2, \end{cases}$ then

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

(a) $\frac{28}{3}$

(b) $\frac{27}{5}$

(c) $\frac{29}{3}$

(d) $\frac{29}{5}$

(e) $\frac{22}{3}$

4. $\int_{0}^{1} (x^{10} + 10^x)\, dx =$

(a) $\frac{1}{11} + \frac{9}{\ln\, 10}$

(b) $\frac{100}{11} + \ln\, 10$

(c) $\frac{1}{11} - 9\ln\, 10$

(d) $\frac{1}{11} + 10\ln\, 10$

(e) $\frac{100}{11} - \ln\, 10$

5. $\displaystyle\int_0^{31} \frac{dx}{\sqrt[5]{(1+x)^4}} =$

(a) 5

(b) 4

(c) 6

(d) 2

(e) 0

6. $\displaystyle\lim_{n\to\infty} \sum_{i=1}^{n} \frac{2}{n}\sqrt{1+\frac{2i}{n}} =$

(a) $\displaystyle\int_1^3 \sqrt{x}\, dx$

(b) $\displaystyle\int_0^3 \sqrt{x}\, dx$

(c) $\displaystyle\int_1^2 \sqrt{x}\, dx$

(d) $\displaystyle\int_2^4 \sqrt{x}\, dx$

(e) $\displaystyle\int_0^2 \sqrt{x}\, dx$

7. $\dfrac{d}{dx}\displaystyle\int_0^{\sec x} \frac{1}{t^2-1}\,dt =$

(a) $\csc x$

(b) $\sec x$

(c) $\tan x$

(d) $\cos x$

(e) $\sin x$

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

(a) $\tan^{-1}(\sin x) + c$

(b) $\ln(\sin x) + c$

(c) $\ln(1+\sin^2 x) + c$

(d) $\tan^{-1}(\cos x) + c$

(e) $\sin^{-1}(\tan x) + c$

9. Given that $\int_0^1 f(x)\,dx = 7$ and $\int_0^1 g(x)\,dx = 5$, then which one of the following statements is **True**?

(a) $\int_0^1 (2f(x) + 3g(x) + 2x)\,dx = 30$

(b) $\int_0^1 (2f(x) - g(x))\,dx = 19$

(c) $\int_0^1 (2f(x) + 4g(x) + 2x)\,dx = 34$

(d) $\int_0^1 f(x)\,g(x)\,dx = 35$

(e) $\int_0^1 \frac{f(x)}{g(x)}\,dx = \frac{7}{5}$

10. A particle moves along a line so that its velocity at time t is $v(t) = 3t^2 - 2t - 8$ (measured in meters per second). The distance traveled during the time period $1 \le t \le 3$ is

(a) 10

(b) 12

(c) 14

(d) 8

(e) 6

11. Using four rectangles and taking the sample points to be left endpoints, then the estimate of the area under the graph of $f(x) = 1 - x^2$ from $x = -1$ to $x = 1$ is equal to

(a) $\frac{5}{4}$

(b) $\frac{3}{4}$

(c) $\frac{1}{4}$

(d) $\frac{7}{4}$

(e) $\frac{11}{4}$

12. The volume of the solid obtained by rotating the region bounded by the curves $2x = y^2$, $x = 0$ and $y = 4$ about the y-axis is equal to

(a) $\frac{256\,\pi}{5}$

(b) $\frac{64\,\pi}{5}$

(c) $\frac{32\,\pi}{3}$

(d) $\frac{64\,\pi}{3}$

(e) $\frac{256\,\pi}{3}$

13. The area of the region enclosed by the curves $x = y^2 - 2$, $y = \ln x$, $y = 1$ and $y = -1$ is equal to

(a) $e - \frac{1}{e} + \frac{10}{3}$

(b) $e + \frac{10}{3}$

(c) $e - \frac{1}{e} + 3$

(d) $e + \frac{1}{e} + 1$

(e) $e - \frac{10}{3}$

14. $\int e^{2x} \sqrt{1 + e^x}\, dx =$

(a) $\frac{2}{5}(1 + e^x)^{5/2} - \frac{2}{3}(1 + e^x)^{3/2} + c$

(b) $\frac{1}{5}(1 + e^x)^{5/2} - \frac{1}{3}(1 + e^x)^{3/2} + c$

(c) $\frac{2}{5}(1 + e^x)^{5/2} + \frac{1}{3}(1 + e^x)^{3/2} + c$

(d) $\frac{1}{5}(1 + e^x)^{5/2} + \frac{2}{3}(1 + e^x)^{3/2} + c$

(e) $\frac{2}{5}(1 + e^x)^{5/2} + \frac{4}{3}(1 + e^x)^{3/2} + c$

15. The volume of the solid obtained by rotating the region bounded by the curves $y = \ln x$, $x = 1$, $x = e$ and $y = 0$ about the line $y = -2$ is given by

(a) $\pi \int_1^e (\ln x)^2 + 4 \ln x \, dx$

(b) $\pi \int_1^e (\ln x)^2 - 4 \, dx$

(c) $2\pi \int_1^e (\ln x + 2)^2 - 2 \, dx$

(d) $\pi \int_1^e (\ln x)^2 + 4 \, dx$

(e) $\pi \int_1^e (\ln x + 2)^2 + 4 \, dx$

16. The area of the region enclosed by the curves $y = \cos x$, $y = \sin 2x$, $x = 0$ and $x = \frac{\pi}{2}$ is equal to

(a) $\frac{1}{2}$

(b) 1

(c) $\frac{1}{4}$

(d) $\frac{1}{8}$

(e) $\frac{1}{3}$

17. $\int_{-3/2}^{3/2}(8+\sinh\,x)\sqrt{\frac{9}{4}-x^2}\,dx =$

(a) $9\,\pi$

(b) $8\,\pi$

(c) $18\,\pi$

(d) 0

(e) $\frac{9\,\pi}{4}$

18. The base of a solid S is bounded by $x=y^3$, $y=1$ and the y-axis. If parallel cross-sections perpendicular to y-axis are equilateral triangles, then the volume of the solid is

(a) $\frac{\sqrt{3}}{28}$

(b) $\frac{1}{8\sqrt{2}}$

(c) $\frac{\sqrt{3}}{12}$

(d) $8\,\sqrt{2}$

(e) $14\,\sqrt{2}$

19. The number $c > 0$ for which the curve $y = c^2 - x^2$ divides the area under the curve $y = 1 - x^2$, $0 \leq x \leq 1$ into two regions of equal areas is

(a) $\dfrac{1}{\sqrt[3]{2}}$

(b) $\dfrac{1}{\sqrt{2}}$

(c) $\dfrac{1}{\sqrt{3}}$

(d) $\dfrac{1}{\sqrt[3]{3}}$

(e) $\dfrac{1}{2}$

20. Suppose that f is an odd an integrable function on $(-\infty, \infty)$ such that $\int_2^1 f(x)\,dx = 2$ and $\int_{-2}^3 f(x)\,dx = 5$, then $\int_{-3}^{-1} f(x)\,dx =$

(a) -3

(b) 7

(c) 3

(d) -7

(e) 0