A. $\frac{1}{2}tan^2x$ B. sec^2x C. $\ln(\cos x)$ D. $\ln(\sec x)$

435. The volume of the solid which is generated when the region bounded by $y=\sqrt{x+1}$ about the x-axis from $x=0$ to $x=2$ is rotated about the x-axis is equal to?

A. 4π B. 3π C. $\frac{4}{3}\pi$ D. $\frac{3}{4}\pi$

2005

436. What is the ant-derivative of $f(x)=\frac{2}{4x^2+4x+1}$?

A. $\frac{1}{2x+1}$ B. $\frac{-2}{2x+1}$ C. $-\frac{1}{2x+1}$ D. $\ln(4x^2+4x+1)$

437. Which one of the following is equal to $\int(1+x)3^x dx$?

A. $(1+x)3^x-3^x+c$ C. $(1+x)(3^x\log_3 e)-3^x(\log_3 e)^2+c$

B. $(1+x)3^x+3^x(\log_3 e)+c$ D. $(1+x)(3^x\log_3 e)-3^x(\log_3 e)+c$

438. Which one of the following is equal to $\int\frac{1}{x^2+x}dx$?

A. $\ln|x^2+x|+c$ C. $\ln|x|-\ln|x+1|+c$

B. $2\ln|x+1|+\ln|x|+c$ D. $\ln|x|+\ln|x+1|+c$

439. What is the value of $\int_0^{\frac{\pi}{2}}2x\cos x\,dx$?

A. $\pi-2$ B. $\frac{\pi}{2}+1$ C. $\pi+2$ D. $\frac{\pi}{2}-1$

440. Which one of the following is equal to $\int\frac{\ln(xe^x)}{x}dx$?

A. $\ln|x|+\frac{1}{2}e^x+c$ C. $\ln|x|+e^{2x}+c$

B. $\frac{1}{2}(\ln x)^2+x+c$ D. $-\frac{1}{x^2}+(\ln x)^2+c$

441. What is the area of the region between the graphs of $y=x^2$ and $y=-x+2$, where $0\le x\le 2$?

A. 3 B. 2 C. $\frac{3}{2}$ D. $\frac{2}{3}$

2006

442. A water tank is a circular cylinder with base radius 2m and height 3m. if the tank is empty and water is pumped into it at rate of $2\ m^3/min$, how long does it take for the tank to be full?

A. 1.5 min B. $\frac{3}{2}\pi$ min C. 6π min D. 12min

443. If $F(x)$ is anti-derivative of $f(x)=1-\frac{2}{x^2}$ and $F(1)=0$, then $F(2)$ is equal to:

A. 0 B. $\frac{1}{2}$ C. $-\frac{1}{2}$ D. 3

444. What is the area of the region between the graphs of $y=-x^2+2$ and $y=|x|$, where $-1\le x\le 2$?

A. $\frac{11}{6}$ B. $\frac{25}{6}$ C. $\frac{7}{3}$ D. $\frac{11}{3}$

445. What is the derivative of $(x)=\int_0^{(x^2+\pi)}\frac{dt}{\sin t+1}$?

A. $\frac{\cos x}{\sin(x^2+\pi)+1}$ C. $\frac{2x\cos x}{\sin(x^2+\pi)+1}$

B. $\frac{2x}{\sin(x^2+\pi)+1}$ D. $\int_0^{2x}\frac{dt}{\sin t+1}$

446. Which one of the following is equal to $\int_0^{\frac{\pi}{2}}(\frac{x-\sin x}{\sec x})dx$?

A. $\frac{\pi-3}{2}$ B. $\frac{\pi-1}{2}$ C. $\frac{3-\pi}{2}$ D. $\frac{\pi+3}{2}$

447. What is the area of the region between the graph of $f(x)=-x^2+4x-3$ and the x-axis from $x=0$ to $x=3$?

A. $-\frac{2}{3}$ B. $\frac{2}{3}$ C. $\frac{4}{3}$ D. $\frac{8}{3}$

448. Which one of the following is equal to $\int\frac{x+\ln(x+1)}{(x+1)^2}dx$?

A. $\ln(x+1)+\frac{x}{x+1}+c$ C. $(x+1)^2-\frac{x}{x+1}+c$

B. $(x+1)^2+\frac{x}{x+1}+c$ D. $\frac{x\ln(x+1)}{x+1}+c$

2007

449. If $f(x) = 2x(x^2+1)^4$ which one of the following is an anti-derivative of $f(x)$?

A. $\frac{2x}{5}(x^2+1)^5 + c$ C. $\frac{x}{5}(x^2+1)^5 + c$

B. $\frac{2}{5}(x^2+1)^5 + c$ D. $\frac{1}{5}(x^2+1)^5 + c$

450. What is the area of the region between the graphs of $y = \sin x$ and the x-axis where $0 \le x \le 2\pi$?

A. 4 B. 4π C. 2 D. 2π

451. If f and g are continuous on $\Re$ and $a, b \in \Re$, which one of the following is necessarily true?

A. If $\int_a^b f(x)dx = \int_a^b g(x)dx$, then $f(x) = g(x)$ for all x$\in [a,b]$.

B. If $f'(x) = g'(x)$ for all x$\in [a,b]$, then $\int_a^b f(x)dx = \int_a^b g(x)dx$.

C. If $f(x) \ge 3$ for all x$[-2,2]$, then $\int_{-2}^{2} f(x) \ge 12$.

D. $\int_a^b f(x)dx = \int_b^a f(x)dx$.

452. Which one of the following is equal to $\int \frac{\ln x + x^2 e^x}{x}$

A. $\frac{1}{2}ln^2x + e^x(x^2-1) + c$ C. $\frac{1}{x^2}\ln x + e^x(x-1) + c$

B. $\frac{1}{2}ln^2x + e^x(x-1) + c$ D $-\frac{1}{x^2}\ln x + e^x(x^2-1) + c$

453. The derivative of the function $F(x) = \int_{-x}^{x} \frac{1}{1+t}dt$ is equal to:

A. $\frac{2}{1-x^2}$ B. $\ln|1+x|$ C. $\frac{1}{1+x}$ D. $\ln\left|\frac{1+x}{1-x}\right|$

454. Which of the following is equal to $\int \frac{(\ln x)^2 + x^2\cos x}{x}dx$? 2008

A. $\frac{1}{x^2}\ln x + x\sin x - \cos x + c$ C. $\frac{1}{3}(\ln x)^3 + x\sin x + \cos x + c$

B. $\frac{1}{3}(\ln x)^3 + x\sin x - \cos x + c$ D. $\frac{1}{x^2}\ln x + x\sin x + \cos x + c$

455. The volume of the solid generated when the region bounded between the graph of $y = \begin{cases} x^2, & 0 \le x \le 2 \\ 4, & 2 \le x \le 3 \end{cases}$ and the x-axis is:

A. $\frac{32\pi}{5}$ B. $\frac{112\pi}{5}$ C. $\frac{112\pi}{3}$ D. $\frac{64\pi}{5}$

456. If $(x) = 3x^2\sqrt{x^3-1}$, then which one of the following is an anti-derivative of $f(x)$?

A. $\frac{3x}{2}(x^3-1)^{\frac{3}{2}} + c$ C. $\frac{3}{2}(x^3-1)^{\frac{3}{2}} + c$

B. $\frac{2}{3}(x^3-1)^{\frac{3}{2}}$ D. $\frac{3}{2}(x^3-1)^{\frac{2}{3}} + c$

457. $\int_0^3 (x+1)^{\frac{1}{2}}dx$ is equal to:

A. $\frac{21}{2}$ B. $\frac{14}{3}$ C. 7 D. $\frac{16}{3}$

458. Given $(x) = \begin{cases} -x+1, & x < 0 \\ \cos\pi x, & x \ge 0 \end{cases}$, then $\int_{-1}^{1} f(x)dx =$.....

A. $\frac{1}{2} + \frac{1}{\pi}$ B. $\frac{1}{2} - \frac{1}{\pi}$ C. $\frac{1}{2}$ D. $-\frac{1}{2}$

459. The value of $\int_0^1 (x+1)\,e^{(x^2+2x)}dx$ is:

A. $\frac{e^3}{2}$ B. $\frac{e^4-e}{2}$ C. $\frac{e^3-1}{2}$ D. $e^3 - 1$

460. If $f(0) = -1, f(1) = 2$ and $f'(x)$ is continuous on $[0,1]$, then which of the following is equal to $\int_0^1 f'(x)\sqrt{2+f(x)}\,dx$? 2009

A. $\frac{16}{3}$ B. $\frac{14}{3}$ C. $\frac{8}{3}$ D. $\frac{4}{3}$

461. What is the value of $\int_0^{\ln\sqrt{3}} \frac{e^x}{e^{-x}+e^x}dx$?

A. $\frac{1}{2}\ln 2$ B. $\ln 4$ C. $\ln 2$ D. 1

462. What is the value of the area of the region enclosed by the graph of $f(x) = e^x$ and $g(x) = x$ between the lines $x = -1$ and $x = 1$?

A. $\frac{e^2-1}{e}$ B. $e^2 - \frac{1}{e}$ C. $e^2 - \frac{1}{e} + 2$ D. $e - \frac{1}{e} + 2$

463. Which of the following is equal to the volume of the solid generated when the region bounded by the graph of $y = 2\sqrt{x+1}$ and the x-axis, when $0 \le x \le 2$, rotates about the x-axis?

A. 8π B. $8\pi^2$ C. 16π D. 16π

464. A particle moves along the x-axis with velocity given by $v(x) = 3t^2 + 6t$ for time $t \ge 0$. If the particle is at position $x = 2$ at time $t = 0$, what is the position of the particle at $t = 1$?

A. 6 B. 9 C. 11 D. 12

465. Which of the following is equal to $\int x(e^x + \sin(x^2))dx$?

A. $e^x(x+1) + \frac{1}{2}\sin(x^2) + c$ C. $e^x(x-1) - \frac{1}{2}\cos(x^2) + c$

B. $e^x(x-1) - \frac{1}{2}\sin(x^2) + c$ D. $e^x(x-1) + \frac{1}{2}\cos(x^2) + c$

466. If $2 \le f'(x) \le 4$ for all values of x, then the value of $f(8) - f(2)$ is between which of the following numbers?

A. 14 and 24 B. 12 and 24 C. 12 and 18 D. 8 and 10

2010

467. What is the area of the region enclosed by the graph of $y^2 = x + 1$ and $y^2 = -x + 1$?

A. $\frac{3}{8} sq.units$ B. $\frac{4}{3} sq.units$ C. $\frac{8}{3} sq.units$ D. $\frac{3}{4} sq.units$

468. What is the value of $\int_1^2 \frac{x+4}{x(x+2)} dx$?

A. 2 B. $\ln 3$ C. $\ln 2$ D. $\ln 4 - \ln 2$

469. If $f'(x) = e^{x-1} + 3x^2 - \frac{1}{x}$ and $f(1) = 5$, what is $f(x)$?

A. $f(x) = e^{x-1} + 3x^2 + \frac{1}{x^2} + 2$ C. $f(x) = e^{x-1} + 3x^2 - \frac{1}{x} + 5$

B. $f(x) = e^{x-1} - x^3 + \ln x + 5$ D. $f(x) = e^{x-1} + x^3 - \ln x + 3$

470. What is the value of $\int_1^9 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$?

A. $e^3 - e$ B. $\frac{e^3}{3} - e$ C. $e\left(e^2 - \frac{1}{3}\right)$ D. $2(e^3 - e)$

471. What is the value of $\int x\sqrt{1-x^2}\mathrm{dx}$?

A. $-\frac{1}{3}(1-x^2)^{\frac{3}{2}} + c$ C. $(1-x^2)^{\frac{3}{2}} + c$

B. $-2x\sqrt{1-x^2} + c$ D. $\frac{1}{2}\sqrt{1-x^2} + c$

472. What is the value of $\int \frac{1}{x}(\ln x + x^2 e^{-x})dx$?

A. $\frac{1}{2}x^2 \ln x - (x+1)e^{-x} + c$ C. $\frac{1}{2}x^2 \ln x + (2-x)e^{-x} + c$

B. $\frac{1}{2}ln^2 x - (x+1)e^{-x} + c$ D. $\frac{1}{2}ln^2 x + (2-x)e^{-x} + c$

473. A cylindrical tank whose inner diameter is 2 m and contains $4\pi m^3$ oil. If the oil is discharged from the tank at the rate of $\frac{2\pi}{3} m^3/min$, then how long (in min) does it take for the tank to be empty?

A. $\frac{4}{3}$ B. 4 C. 12 D. 6

2011

474. If $F(X) = \int_0^x e^{-t}\, dt$, then what is the value of $F'(x)$?

A. e^{-x} B. $-e^{-x} - 1$ C. $\frac{e^{-x+1}}{-x+1}$ D. $-e^{-x}$

475. What is the value of $\int_1^2 \frac{\ln x}{x^2}\mathrm{dx}$?

A. $-\frac{\ln 2}{2} - \frac{1}{2}$ B. $\frac{\ln 2}{2} - \frac{1}{2}$ C. $-\frac{\ln 2}{2} + \frac{1}{2}$ D. $\frac{\ln 2}{2} + \frac{1}{2}$

476. What is the value of $\int \frac{x^{e^{-1}} + e^{x-1}}{x^e + e^x} dx$?

A. $\frac{1}{2}\ln(x^e + e^{x+1}) + c$ C. $\frac{1}{2}\ln((x+1)^e + e^{x+1}) + c$