1.

An equation for a tangent to the graph of $y = \arcsin\dfrac{x}{2}$ at the origin is

(A) $x - 2y = 0$ (B) $x - y = 0$ (C) $x = 0$ (D) $y = 0$ (E) $\pi x - 2y = 0$

2.

The slope of the line tangent to the graph of $y = \ln\left(x^2\right)$ at $x = e^2$ is

(A) $\dfrac{1}{e^2}$ (B) $\dfrac{2}{e^2}$ (C) $\dfrac{4}{e^2}$ (D) $\dfrac{1}{e^4}$ (E) $\dfrac{4}{e^4}$

3.

$\dfrac{d}{dx}\left(\arcsin 2x\right) =$

(A) $\dfrac{-1}{2\sqrt{1-4x^2}}$ (B) $\dfrac{-2}{\sqrt{4x^2-1}}$ (C) $\dfrac{1}{2\sqrt{1-4x^2}}$

(D) $\dfrac{2}{\sqrt{1-4x^2}}$ (E) $\dfrac{2}{\sqrt{4x^2-1}}$

4.

$\displaystyle\int \dfrac{5}{1+x^2}\,dx =$

(A) $\dfrac{-10x}{\left(1+x^2\right)^2}+C$ (B) $\dfrac{5}{2x}\ln\left(1+x^2\right)+C$ (C) $5x-\dfrac{5}{x}+C$

(D) $5\arctan x + C$ (E) $5\ln\left(1+x^2\right)+C$

5.

If $\tan(xy) = x$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{1-y\tan(xy)\sec(xy)}{x\tan(xy)\sec(xy)}$ (B) $\dfrac{\sec^2(xy)-y}{x}$ (C) $\cos^2(xy)$

(D) $\dfrac{\cos^2(xy)}{x}$ (E) $\dfrac{\cos^2(xy)-y}{x}$

6.

If $y = \arctan(\cos x)$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{-\sin x}{1+\cos^2 x}$ (B) $-\left(\operatorname{arcsec}(\cos x)\right)^2\sin x$ (C) $\left(\operatorname{arcsec}(\cos x)\right)^2$

(D) $\dfrac{1}{\left(\arccos x\right)^2+1}$ (E) $\dfrac{1}{1+\cos^2 x}$

7.

Which of the following is equal to $\displaystyle\int \frac{1}{\sqrt{25-x^2}}\,dx$?

(A) $\arcsin\dfrac{x}{5}+C$

(B) $\arcsin x+C$

(C) $\dfrac{1}{5}\arcsin\dfrac{x}{5}+C$

(D) $\sqrt{25-x^2}+C$

(E) $2\sqrt{25-x^2}+C$

8.

$\displaystyle\int \frac{x\,dx}{\sqrt{3x^2+5}}=$

(A) $\dfrac{1}{9}(3x^2+5)^{\frac{3}{2}}+C$

(B) $\dfrac{1}{4}(3x^2+5)^{\frac{3}{2}}+C$

(C) $\dfrac{1}{12}(3x^2+5)^{\frac{1}{2}}+C$

(D) $\dfrac{1}{3}(3x^2+5)^{\frac{1}{2}}+C$

(E) $\dfrac{3}{2}(3x^2+5)^{\frac{1}{2}}+C$

9.

$\dfrac{d}{dx}\left(2^x\right)=$

(A) 2^{x-1}

(B) $(2^{x-1})x$

(C) $(2^x)\ln 2$

(D) $(2^{x-1})\ln 2$

(E) $\dfrac{2x}{\ln 2}$

10.

If $f(x)=e^{3\ln(x^2)}$, then $f'(x)=$

(A) $e^{3\ln(x^2)}$

(B) $\dfrac{3}{x^2}e^{3\ln(x^2)}$

(C) $6(\ln x)e^{3\ln(x^2)}$

(D) $5x^4$

(E) $6x^5$

11.

$\displaystyle\int_0^{\sqrt{3}} \frac{dx}{\sqrt{4-x^2}}=$

(A) $\dfrac{\pi}{3}$

(B) $\dfrac{\pi}{4}$

(C) $\dfrac{\pi}{6}$

(D) $\dfrac{1}{2}\ln 2$

(E) $-\ln 2$

12.

If $y=\arctan(e^{2x})$, then $\dfrac{dy}{dx}=$

(A) $\dfrac{2e^{2x}}{\sqrt{1-e^{4x}}}$

(B) $\dfrac{2e^{2x}}{1+e^{4x}}$

(C) $\dfrac{e^{2x}}{1+e^{4x}}$

(D) $\dfrac{1}{\sqrt{1-e^{4x}}}$

(E) $\dfrac{1}{1+e^{4x}}$

13.

The table shows the rate in liters/minute at which water leaked out of a container.

Time (min)	0	1.2	2.3	3.8	5.4
Rate (liters/min)	5.6	4.3	3.1	2.2	1.5

A right hand Riemann sum is computed using the four subintervals indicated by the data in the table. This Riemann sum estimates the total amount of water that has leaked out of the container. What is the estimate?

A) 12.70 *l*   B) 14.27 *l*   C)16.7 *l*   D) 16.95 *l*   E) 19.62 *l*

14.

$$\int x(x^2 - 1)^4 \, dx =$$

a) $\frac{1}{10}(x^2)(x^2 - 1)^5$

b) $\frac{1}{10}(x^2 - 1)^5 + C$

c) $\frac{1}{5}(x^3 - x)^5 + C$

d) $\frac{1}{5}(x^2 - 1)^5 + C$

e) $\frac{1}{2}(x^2 - 1)^5 + C$

15.

$$\int \frac{dx}{16 + x^2} =$$

a) $\frac{1}{4} \tan^{-1}\left(\frac{x}{4}\right) + C$

b) $\frac{1}{16} \tan^{-1}\left(\frac{x}{16}\right) + C$

c) $4\tan^{-1}\left(\frac{x}{16}\right) + C$

d) $\frac{1}{4} \sec^2\left(\frac{x}{4}\right) + C$

e) $\frac{1}{4} \tan^{-1}(4x) + C$

16.

Evaluate: $\displaystyle\int \frac{7}{x^2 + 10x + 34} \, dx$

a) $7 \ln|x^2 + 6x + 13| + C$

b) $7\left(\frac{x^3}{3} + 5x^2 + 34x\right) + C$

c) $\frac{7}{3} \tan^{-1}\left(\frac{x+5}{3}\right) + C$

d) $-\frac{7}{x} + \frac{7}{5}\ln|x| + \frac{7}{10}x + C$

e) $\frac{17}{x^3} + \frac{7}{3x^2} + \frac{5}{10x} + C$

17.

$$\int \frac{9 \, dx}{\sqrt{4 - x^2}} =$$

a) $\sin^{-1}\frac{x}{2} + C$

b) $4\sin^{-1}\frac{x}{2} + C$

c) $4\tan^{-1}\frac{x}{2} + C$

d) $9\sin^{-1}\frac{x}{2} + C$

e) $9\cos^{-1}\frac{x}{2} + C$

18. Let $f(x) = 2e^{3x}$ and $g(x) = 5x^3$. At what value of x do the graphs of f and g have parallel tangents (calculator)?

(A) -0.445   (C) -0.344   (E) -0.165
(B) -0.366   (D) -0.251

19. If $f(x) = 2e^x - \dfrac{5}{3}x^3$, which of the following values of x does f have a relative maximum value (calculator)?

(A) -0.494

(C) 1.092

(E) 3.310

(B) 0.259

(D) 2.543

20. A particle moves in a line with velocity. $v(t) = 3t^2 - e^t$ What is the average velocity of the particle in the closed interval [0, 2]?

(A) $\dfrac{8-e^2}{2}$

(B) $\dfrac{9-e^2}{2}$

(C) $\dfrac{11-e^2}{2}$

(D) $\dfrac{13-e^2}{2}$

(E) $13 - e^2$

1. A	2. B	3. D	4. D	5. E
6. A	7. A	8. D	9. C	10. E
11. A	12. B	13. B	14. B	15. A
16. C	17. D	18. B	19. C	20. B