Station #1:

Find the derivative of the function. $f(x)=x^5+\sin x+\cos x+\ln x+e^x$

a. $f'(x)=5x+\cos x+\sin x+\frac{1}{x}+e^x$ go to station 13

b. $f'(x)=x^4+\cos x-\sin x+\ln x+xe^{x-1}$ go to station 8

c. $f'(x)=5x^4+\cos x-\sin x+\frac{1}{x}+e^x$ go to station 7

d. $f'(x)=5x^4-\cos x+\sin x+\ln +xe^{x-1}$ go to station 2

Station #2:

Find dy/dx. $y=5x^3+\sqrt[3]{x}+\frac{1}{x^2}+\sqrt{x}+8$

a. $\frac{dy}{dx}=8x^2+\frac{1}{3\sqrt{x}}-2x+\frac{1}{2\sqrt{x}}$ go to station 12

b. $\frac{dy}{dx}=15x^2+\frac{1}{3\sqrt[3]{x^2}}-\frac{2}{x^3}+\frac{1}{2\sqrt{x}}$ go to station 3

c. $\frac{dy}{dx}=15x^2+\frac{1}{3\sqrt[2]{x^3}}-2x+\frac{1}{2\sqrt{x}}+8$ go to station 11

d. $\frac{dy}{dx}=8x^2+\frac{1}{3\sqrt[3]{x^2}}-\frac{2}{x^3}+\sqrt{x}+8$ go to station 9

Station #3:

Find y'. $y=\sin(2x+1)+\cos(3x^2-5)+e^{7x+1}+\ln(5x-1)+(4x-3)^6$

a. $y'=2\cos(2x+1)-6x\sin(3x^2-5)+7e^{7x+1}+\frac{5}{5x-1}+24(4x-3)^5$ go to station 11

b. $y'=\cos(2x+1)-\sin(3x^2-5)+e^{7x+1}+\frac{1}{5x-1}+6(4x-3)^5$ go to station 12

c. $y'=2\cos(2x+1)-6x\sin(3x^2-5)+7e^{7x+1}+\frac{5}{5x-1}+24(4x-3)$ go to station 6

d. $y'=2\sin(2x+1)-6x\cos(3x^2-5)+e^{7x+1}+\frac{1}{x-1}+6(4x-3)^5$ go to station 9

Station #4:

Find $f'(x)$ if $f(x)=x\sqrt{2x-3}$

a. $f'(x)=\dfrac{3x-3}{\sqrt{2x-3}}$ go to station 14

b. $f'(x)=\dfrac{-x+3}{\sqrt{2x-3}}$ go to station 1

c. $f'(x)=\dfrac{x}{\sqrt{2x-3}}$ go to station 7

d. $f'(x)=\dfrac{5x-6}{2\sqrt{2x-3}}$ go to station 8

Station #5:

Find $\dfrac{d}{dx}\left[\dfrac{1+x^2}{1-x^2}\right]$.

a. $\dfrac{d}{dx}\left[\dfrac{1+x^2}{1-x^2}\right]=\dfrac{-4x}{(1-x^2)^2}$ go to station 1

b. $\dfrac{d}{dx}\left[\dfrac{1+x^2}{1-x^2}\right]=\dfrac{4x}{(1-x^2)^2}$ go to station 10

c. $\dfrac{d}{dx}\left[\dfrac{1+x^2}{1-x^2}\right]=\dfrac{-4x^3}{(1-x^2)^2}$ go to station 4

d. $\dfrac{d}{dx}\left[\dfrac{1+x^2}{1-x^2}\right]=\dfrac{2x}{1-x^2}$ go to station 14

Station #6:

Find the derivative. $y=x^2\sin\dfrac{1}{x}$ $(x\neq 0)$

a. $y'=2x\sin\dfrac{1}{x}-x^2\cos\dfrac{1}{x}$ go to station 10

b. $y'=-\dfrac{2}{x}\cos\dfrac{1}{x}$ go to station 14

c. $y'=2x\sin\dfrac{1}{x}-\cos\dfrac{1}{x}$ go to station 5

d. $y'=2x\cos\dfrac{1}{x}$ go to station 4

Station #7:

Find the equation of the tangent line for $f(x)=3x^2-2x+7$ at $x=1$.

a. $y-1=4(x-1)$ go to station 3

b. $y-7=1(x-1)$ go to station 2

c. $y-8=1(x-1)$ go to station 13

d. $y-8=4(x-1)$ go to station 8

Station #8:

If an object is thrown upward at 64ft/s from a height of 20 feet, its height *S* after *x* seconds is given by

$$S(x)=20+64x-16x^2$$

What is the average velocity in the first 2 seconds it is thrown? What is the velocity at 2 seconds? What is the acceleration at 2 seconds?

a. $84\ ft/sec;0\ ft/sec;-9.8\ ft^2/sec$ go to station 11

b. $32\ ft/sec;32\ ft/sec;32\ ft^2/sec$ go to station 3

c. $32\ ft/sec;0\ ft/sec;-32\ ft^2/sec$ go to station 13

d. $84\ ft/sec;32\ ft/sec;-9.8\ ft^2/sec$ go to station 2

Station #9:

The radius r of a sphere is increasing at a uniform rate of 0.3 inches per second. At the instant when the surface area S becomes 100π square inches, what is the rate of increase, in cubic inches per second, in the volume V? $\left(S=4\pi r^2; V=\frac{4}{3}\pi r^3\right)$

a. 30π in^3/sec go to station 6

b. 10π in^3/sec go to station 10

c. 12π in^3/sec go to station 4

d. 22.5π in^3/sec go to station 5

Station #10:

Use implicit differentiation to find dy/dx. $x^3 - xy + y^3 = 1$

a. $\frac{dy}{dx} = \frac{3x^2}{x - 3y^2}$ go to station 7

b. $\frac{dy}{dx} = \frac{3x^2 - 1}{1 - 3y^2}$ go to station 14

c. $\frac{dy}{dx} = \frac{3x^2 - 3y^2 - y}{x}$ go to station 1

d. $\frac{dy}{dx} = \frac{y - 3x^2}{3y^2 - x}$ go to station 4

Station #11:

Find $D_x[y]$ if $y = 2^x + 3^{4x} + \log_5 x + \log_6(7x+1)$.

a. $D_x[y] = 2^x + 4(3^{4x}) + \frac{1}{x} + \frac{7}{7x+1}$ go to station 5

b. $D_x[y] = (\ln 2)2^x + (\ln 3)3^{4x} + \frac{1}{(\ln 5)x} + \frac{1}{(\ln 6)(7x+1)}$ go to station 6

c. $D_x[y] = x2^{x-1} + (4x)3^{4x-1} + \frac{1}{(\ln 5)x} + \frac{7}{(\ln 6)(7x+1)}$ go to station 9

d. $D_x[y] = (\ln 2)2^x + 4(\ln 3)3^{4x} + \frac{1}{(\ln 5)x} + \frac{7}{(\ln 6)(7x+1)}$ go to station 12

Station #12:

Find $D_x[f]$ if $f(x) = 3\tan x + \sec(4x) + \csc(x^2) + \cot^2(5x)$.

a. $D_x[f] = 3\sec^2 x + \sec(4x)\tan(4x) - \csc(x^2)\cot(x^2) - 2\cot(5x)\csc^2(5x)$ go to station 10

b. $D_x[f] = 3\sec^2 x + 4\sec(4x)\tan(4x) - 2x\csc(x^2)\cot(x^2) - 5\csc^2(5x)$ go to station 6

c. $D_x[f] = 3\sec^2 x + 4\sec(4x)\tan(4x) - 2x\csc(x^2)\cot(x^2) - 10\cot(5x)\csc^2(5x)$ go to station 9

d. $D_x[f] = \sec^2 x + 4\sec(4x)\tan(4x) - 2x\csc(x^2)\cot(x^2) - 2\cot(5x)\csc^2(5x)$ go to station 5

Station #13:

Find $f'(x)$ for

$$f(x)=\arcsin(x^2)+\arccos(3x)+2\arctan(x)+4\,\mathrm{arcsec}(x)+\mathrm{arccsc}(5x)+\mathrm{arccot}(\sqrt{x}).$$

a. $f'(x)=\frac{2x}{\sqrt{1-x^4}}+\frac{3}{\sqrt{1-9x^2}}+\frac{2}{1+x^2}+\frac{4}{|x|\sqrt{x^2-1}}+\frac{5}{|5x|\sqrt{25x^2-1}}+\frac{1}{2\sqrt{x}(1+x)}$ go to station 3

b. $f'(x)=\frac{2x}{\sqrt{1-x^4}}-\frac{3}{\sqrt{1-9x^2}}+\frac{2}{1+x^2}+\frac{4}{|x|\sqrt{x^2-1}}-\frac{5}{|5x|\sqrt{25x^2-1}}-\frac{1}{2\sqrt{x}(1+x)}$ go to station 2

c. $f'(x)=\frac{1}{\sqrt{1-x^4}}-\frac{1}{\sqrt{1-9x^2}}+\frac{1}{1+x^2}+\frac{1}{|x|\sqrt{x^2-1}}-\frac{1}{|5x|\sqrt{25x^2-1}}-\frac{1}{1+x}$ go to station 11

d. $f'(x)=\frac{2x}{\sqrt{1-x^2}}-\frac{3}{\sqrt{1-3x^2}}+\frac{2}{1+x^2}+\frac{4}{|x|\sqrt{x^2-1}}-\frac{5}{|5x|\sqrt{5x^2-1}}-\frac{1}{2\sqrt{x}(1+x)}$ go to station 12

Station #14:

Find $\frac{d^3y}{dx^3}$ for $y=5x^6+7x^5-8x^4+9x^3+3x^2-2x+7$.

a. $\frac{d^3y}{dx^3}=30x^5+35x^4-24x^3+27x^2+6x-2$ go to station 7

b. $\frac{d^3y}{dx^3}=150x^4+140x^3-72x^2+54x+6$ go to station 13

c. $\frac{d^3y}{dx^3}=600x^3+420x^2-144x+54$ go to station 1

d. $\frac{d^3y}{dx^3}=1800x^2+840x-144$ go to station 8

Path

1 to 7 to 8 to 13 to 2 to 3 to 11 to 12 to 9 to 6 to 5 to 10 to 4 to 14 to 1

Answers

Station #1	$f'(x)=5x^4+\cos x-\sin x+\frac{1}{x}+e^x$
Station #2	$\frac{dy}{dx}=15x^2+\frac{1}{3\sqrt[3]{x^2}}-\frac{2}{x^3}+\frac{1}{2\sqrt{x}}$
Station #3	$y'=2\cos(2x+1)-6x\sin(3x^2-5)+7e^{7x+1}+\frac{5}{5x-1}+24(4x-3)^5$
Station #4	$f'(x)=\frac{3x-3}{\sqrt{2x-3}}$
Station #5	$\frac{d}{dx}\left[\frac{1+x^2}{1-x^2}\right]=\frac{4x}{(1-x^2)^2}$
Station #6	$y'=2x\sin\frac{1}{x}-\cos\frac{1}{x}$
Station #7	$y-8=4(x-1)$
Station #8	$32\ ft/sec;0\ ft/sec;-32\ ft^2/sec$
Station #9	$30\pi\ \text{in}^3/sec$
Station #10	$\frac{dy}{dx}=\frac{y-3x^2}{3y^2-x}$
Station #11	$D_x[y]=(\ln 2)2^x+4(\ln 3)3^{4x}+\frac{1}{(\ln 5)x}+\frac{7}{(\ln 6)(7x+1)}$
Station #12	$D_x[f]=3\sec^2 x+4\sec(4x)\tan(4x)-2x\csc(x^2)\cot(x^2)-10\cot(5x)\csc^2(5x)$
Station #13	$f'(x)=\frac{2x}{\sqrt{1-x^4}}-\frac{3}{\sqrt{1-9x^2}}+\frac{2}{1+x^2}+\frac{4}{\lvert x\rvert\sqrt{x^2-1}}-\frac{5}{\lvert 5x\rvert\sqrt{25x^2-1}}-\frac{1}{2\sqrt{x}(1+x)}$
Station #14	$\frac{d^3y}{dx^3}=600x^3+420x^2-144x+54$