1. If $f(x)=\cos(\ln(x))$ for $x>0$, then $f'(x)=$

$$f(x)=\cos(\ln(x))$$
$$f'(x)=-\sin(\ln(x))\cdot\frac{1}{x}$$

(a) $-\sin(\ln(x))$ (b) $\sin(\ln(x))$ (c) $-\frac{\sin(\ln(x))}{x}$ (d) $\frac{\sin(\ln(x))}{x}$ (e) $\sin\left(\frac{\ln(x)}{x}\right)$

2. If $f(x)=x\cdot 2^x$, then $f'(x)=$

$$f(x)=x\cdot 2^x$$
$$f'(x)=1\cdot 2^x+x\cdot\ln(2)2^x$$
$$=2^x(1+x\ln(2))$$

(a) $2^x(x+\ln(2))$ (b) $2^x(1+\ln(2))$ (c) $x\cdot 2^x\cdot\ln(2)$ (d) $2^x(1+x\ln(2))$ (e) $x\cdot 2^x(1+\ln(2))$

3. Let $f(x)=x^3-x+2$. If h is the inverse of *f*, then $h'(2)=$

$$h'(2)=\frac{1}{f'\left(\begin{array}{c}\text{whatever makes}\\ f(x)=2\end{array}\right)}$$
$$=\frac{1}{f'(1)}\text{ or }\frac{1}{f'(0)} \qquad f(x)=2\text{ when }x=0\text{ or }1$$
$$=\frac{1}{2}\text{ or }\frac{1}{-1}$$
$$f'(x)=3x^2-1$$
$$f'(1)=2$$
$$f'(0)=-1$$

(a) $\frac{1}{26}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) 2 (e) 26

Let f and g be two differentiable functions. The following table contains information about, f,g, and their derivatives f' and g', respectively. What is the value of

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	4	–3	3	2
3	6	2	–2	3

4. What is the value of $\left(\frac{f}{g}\right)'(1)$?

$$\begin{aligned}\left(\frac{f}{g}\right)'(1) &= \frac{f'(1)g(1) - f(1)g'(1)}{\left[g(1)\right]^2} \\ &= \frac{(-3)(3)-(4)(2)}{(3)^2} \\ &= -\frac{17}{9}\end{aligned}$$

(a) $-\frac{3}{2}$ (b) $-\frac{1}{9}$ (c) $-\frac{17}{9}$ (d) $-\frac{14}{4}$ (e) $-\frac{17}{3}$

5. What is the value of $(f \cdot g)'(3)$?

$$\begin{aligned}(f\cdot g)'(3) &= f'(3)g(3) + f(3)g'(3) \\ &= (2)(-2)+(6)(3) \\ &= 14\end{aligned}$$

(a) –6 (b) 6 (c) 12 (d) 14 (e) 22

6. $\frac{d}{dx}\left[5\sin^2(6x)+5\cos^2(6x)\right]=$

$$\frac{d}{dx}\left[5\sin^2(6x)+5\cos^2(6x)\right]=10\sin(6x)\cdot\cos(6x)\cdot 6+10\cos(6x)\left[-\sin(6x)\right]\cdot 6$$
$$=0$$

(a) $30\cos^2(6x)-30\sin^2(6x)$

(b) $5\cos^2(6x)-5\sin^2(6x)$

(c) $120\sin(6x)\cos(6x)$

(d) 30

(e) 0

7. An equation of the line tangent to the curve $x^2+y^2=25$ at $(-4,3)$ is

$$\begin{aligned} x^2+y^2&=25\\ &\downarrow\\ 2x+2yy'&=0\\ 2(-4)++2(3)y'&=0\\ -8+6y'&=0\\ y'&=\frac{8}{6}=\frac{4}{3} \end{aligned}$$

$$\begin{aligned} y-3&=\frac{4}{3}(x+4)\\ 3y-9&=4(x+4)\\ 3y-9&=4x+16\\ 3y-4x&=25 \end{aligned}$$

(a) $3y-4x=25$ (b) $4y-3x=25$ (c) $-4y+3x=20$ (d) $3y+4x=-25$ (e) $3y-4x=20$

8. $\frac{d}{dx}\left[\ln(3x)\cdot 5^{2x}\right]=$

$$\frac{d}{dx}\left[\ln(3x)\cdot 5^{2x}\right]=\left[\frac{1}{3x}\cdot 3\right]\cdot 5^{2x}+\ln(3x)\cdot\left[\ln(5)5^{2x}\cdot 2\right]$$
$$=\frac{5^{2x}}{x}+2\ln(5)\ln(3x)5^{2x}$$

(a) $\frac{5^{2x}}{x}+2\ln(5)\ln(3x)5^{2x}$

(b) $\frac{5^{2x}}{3x}-2x\ln(3x)5^{2x}$

(c) $\frac{5^{2x}}{x}-\ln(5)\ln(3x)5^{2x}$

(d) $\frac{5^{2x}}{3x}+2\ln(3x)5^{2x}$

(e) $\frac{5^{2x}}{x}+\ln(5)\ln(3x)5^{2x}$

9. If $e^{xy+1}=3$, what is $\frac{dy}{dx}$ at $x=1$? Hint: You will need to solve for the value of y!

$$e^{xy+1}=3$$
$$\downarrow$$

$$\begin{aligned} e^{xy+1}&=3\\ e^{1\cdot y+1}&=3\\ e^{y+1}&=3\\ y+1&=\ln(3)\\ y&=\ln(3)-1 \end{aligned}$$

$$\begin{aligned} e^{xy+1}\cdot(1\cdot y+xy'+0)&=0\\ e^{xy+1}(y+xy')&=0\\ e^{(1)(\ln(3)-1)+1}\left((\ln(3)-1)+(1)y'\right)&=0\\ e^{\ln(3)}(\ln(3)-1+y')&=0\\ 3(\ln(3)-1+y')&=0\\ \ln(3)-1+y'&=0\\ y'&=1-\ln(3) \end{aligned}$$

(a) $\frac{1}{\ln(3)}$ (b) $1-\ln(3)$ (c) $\ln(3)-1$ (d) $3e^3$ (e) $\ln(3)$

10. What is the 57th derivative of $y=\cos(7x)$?

$$\begin{array}{llllllll} \text{0th} & \cos(7x) & \text{4th} & \cos(7x)\cdot 7^4 & \cdots & \text{56th} & \cos(7x)\cdot 7^{56} \\ \text{1st} & -\sin(7x)\cdot 7 & \text{5th} & -\sin(7x)\cdot 7 & \cdots & \text{57th} & -\sin(7x)\cdot 7^{57} \\ \text{2nd} & -\cos(7x)\cdot 7^2 & \vdots & & \cdots & & \\ \text{3rd} & \sin(7x)\cdot 7^3 & & & \cdots & & \end{array}$$

(a) $-7^{57}\sin(7x)$ (b) $7^{57}\sin(7x)$ (c) $-7^{57}\cos(7x)$ (d) $7^{58}\sin(7x)$ (e) $7^{57}\cos(7x)$

11. $\left[\arctan\left(e^{x^2}\right)\right]' =$

$$\left[\arctan\left(e^{x^2}\right)\right]' = \frac{1}{1+\left(e^{x^2}\right)^2}\cdot e^{x^2}\cdot 2x$$

$$= \frac{2xe^{x^2}}{1+e^{2x^2}}$$

(a) $\dfrac{2xe^{x^2}}{1+e^{2x^2}}$ (b) $\dfrac{4xe^{x^2}}{1+e^{x^4}}$ (c) $\dfrac{2x}{1+e^{2x^2}}$ (d) $\dfrac{2xe^{x^2}}{1+e^{x^2}}$ (e) $\dfrac{2xe^{x^2}}{\sqrt{1-e^{2x^2}}}$

12. If $\tan(2y)=xe^y$, then $y'=$

$$\tan(2y)=xe^y$$
$$\downarrow$$
$$\sec^2(2y)\cdot 2y' = 1\cdot e^y + xe^y\cdot y'$$
$$\sec^2(2y)\cdot 2y' - xe^y\cdot y' = 1\cdot e^y$$
$$y'\left(\sec^2(2y)\cdot 2 - xe^y\right) = 1\cdot e^y$$
$$y' = \frac{e^y}{\sec^2(2y)\cdot 2 - xe^y}$$

(a) $\dfrac{\sec^2 2y}{e^y}$

(b) $\dfrac{e^y}{2\sec^2(2y)-xe^y}$

(c) $\dfrac{e^y+xe^y}{2\sec^2(2y)}$

(d) $\dfrac{e^y}{\sec^2(2y)-xe^y}$

(e) $\dfrac{e^y}{2\sec(2y)\tan(2y)-xe^y}$

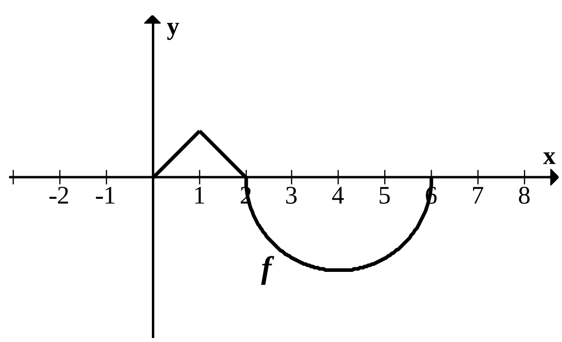
13. Given the equation of the curve $xy = 5 + y$, where y is a twice differentiable function of x, what is y''?

$$\begin{aligned} xy &= 5 + y \\ &\downarrow \\ 1 \cdot y + xy' &= y' \\ y &= y' - xy' \\ y &= y'(1-x) \\ y' &= \frac{y}{1-x} \end{aligned}$$

$$\begin{aligned} y' &= \frac{y}{1-x} \\ &\downarrow \\ y'' &= \frac{(y')(1-x) - y(-1)}{(1-x)^2} \\ &= \frac{\left(\frac{y}{1-x}\right)(1-x) + y}{(1-x)^2} \\ &= \frac{2y}{(1-x)^2} \\ &= \frac{2y}{\left[-(x-1)\right]^2} \\ &= \frac{2y}{(x-1)^2} \end{aligned}$$

(a) $\dfrac{1-x+y}{(1+x^2)}$ (b) 0 (c) $\dfrac{2y}{(x-1)^2}$ (d) $-\dfrac{2y}{(x-1)^2}$ (e) $-\dfrac{y}{x-1}$

14. The graph of f at right consists of line segments and a semicircle. $f'(x) = 0$ when



(a) 1 only
(b) 2 only
(c) 4 only
(d) 1 and 4
(e) 2 and 6