1. $f(x) = \sin^2\left(\frac{\pi}{2}\cdot\frac{x}{2}\right)$

$f'(x) = 2.\sin\left(\frac{\pi}{2}\right)\cdot\left(\frac{x}{2}\right)\cdot\frac{\pi}{4}\cdot\cos\left(\frac{\pi}{2}\cdot\frac{x}{2}\right)$

$f'(1) = 2.\sin\frac{\pi}{4}\cdot\frac{\pi}{4}\cdot\cos\frac{\pi}{4}$

$= 2\cdot\frac{\sqrt{2}}{2}\cdot\frac{\pi}{4}\cdot\frac{\sqrt{2}}{2} = 2\cdot\frac{2}{4}\cdot\frac{\pi}{4} = \frac{\pi}{4}$

Cevap: C

2. $f'(x) = 1.\ln(xe^x) + \frac{1.e^x + e^x.x}{x.e^x}\cdot x$

$f'(1) = \ln(e) + \frac{2e^x}{e^x}\cdot 1$

$= 1 + 2 = 3$

Cevap: D

3. $y = \frac{\sin x}{x^2}$

$y'\left(\frac{\pi}{2}\right) = ?$

$y' = \frac{\cos x.x^2 - 2x.\sin x}{(x^2)^2}$

$y'\left(\frac{\pi}{2}\right) = \frac{\cos\frac{\pi}{2}\cdot\left(\frac{\pi}{2}\right)^2 - 2\cdot\frac{\pi}{2}\cdot\sin\frac{\pi}{2}}{\left(\frac{\pi}{2}\right)^4}$

$= \frac{0.\left(\frac{\pi}{2}\right)^2 - \pi.1}{\frac{\pi^4}{16}} = \frac{-\pi}{\frac{\pi^4}{16}}$

$= -\frac{16}{\pi^3} = -2^4.\pi^{-3}$

Cevap: D

4. $f'(x) = -2.\cos(e^{2x} - x^3).\sin(e^{2x} - x^3).(2e^{2x} - 3x^2)$

$f'(x) = -\sin\left(2.(e^{2x} - x^3)\right).(2.e^{2x} - 3.x^2)$

$f'(0) = -\sin\left(2(e^0 - 0)\right).(2.e^0 - 3.0) = -2.\sin 2$

Cevap: C

5. $f'(x) = \frac{\left(\frac{1-\cos x}{\sin x}\right)'}{\frac{1-\cos x}{\sin x}}$

$f'(x) = \frac{\frac{\sin x.\sin x - \cos x(1-\cos x)}{\sin^2 x}}{\frac{1-\cos x}{\sin x}}$

$f'\left(\frac{\pi}{2}\right) = \frac{\frac{\sin^2\frac{\pi}{2} - \cos\frac{\pi}{2}\left(1-\cos\frac{\pi}{2}\right)}{\sin^2\frac{\pi}{2}}}{\frac{1-\cos\frac{\pi}{2}}{\sin\frac{\pi}{2}}}$

$= \frac{1}{1} = 1$

Cevap: B

6. $f(x) = -\cos x$

$f'(x) = \sin x$

$f'\left(\frac{3\pi}{4}\right) = \sin\frac{3\pi}{4} = \sin 135$

$= \sin(180 - 45)$

$= \sin 45 = \frac{\sqrt{2}}{2}$

Cevap: E

7. $f^{I}(x) = -2.\cos(2x).\sin(\sin(2x))$

$f^{I}\left(\frac{\pi}{4}\right) = -2.\cos\left(2\cdot\frac{\pi}{4}\right).\sin\left(\sin\left(2\cdot\frac{\pi}{4}\right)\right)$

$= -2.0 = 0$

Cevap: C

8. $f^{I}(x) = \frac{\left(\frac{e^x}{x^2+1}\right)^{I}}{\frac{e^x}{x^2+1}} = \frac{\frac{e^x.(x^2+1)-2x.e^x}{(x^2+1)^2}}{\frac{e^x}{x^2+1}}$

$f^{I}(1) = \frac{\frac{e.2-2.e}{2^2}}{\frac{e}{2}} = 0$

Cevap: C

9. $f^{I}(x) = 3(\ln(x+1)+\sin2x)^2.\left(\frac{1}{x+1}+2.\cos2x\right)+1.e^x+e^x.x$

$f^{I}(0) = 3(\ln(1)+\sin2.0)^2.\left(\frac{1}{1}+2.\cos0\right)+e^0+e^0.0$

$f^{I}(0) = 1$

Cevap: B

10. $f^{I}(x) = 2.\cos x.e^{2\sin x}$

Cevap: A

11. $f^{I}(x) = e^x.\cos x - \sin x.e^x$

$f^{II}(x) = e^x.\cos x - \sin x.e^x - \cos x.e^x - e^x.\sin x$

$= -2.e^x.\sin x$

$f^{II}\left(\frac{\pi}{6}\right) = -2.e^{\frac{\pi}{6}}.\sin\frac{\pi}{6}$

$= -e^{\frac{\pi}{6}}$

Cevap: B

12. $f^{I}(x) = -2\sin2x + 2\sin x.\cos x$

$= -2\sin2x + \sin2x = -\sin2x$

$f^{I}\left(\frac{\pi}{4}\right) = -\sin\left(2\cdot\frac{\pi}{4}\right) = -1$

Cevap: A

13. $f^{I}(x) = 2\cos2x - 2.\cos2x.2.\sin2x$

$= 2.\cos2x - 2.\sin4x$

$f^{I}\left(\frac{\pi}{4}\right) = 2.\cos\left(2\cdot\frac{\pi}{4}\right) - 2.\sin\left(4\cdot\frac{\pi}{4}\right)$

$= 0$

Cevap: C

14. $(1-\tan^2x)\cos2x + 2\tan x.\sin2x$

$\left(1-\frac{\sin^2x}{\cos^2x}\right)\cdot\cos2x + 2\cdot\frac{\sin x}{\cos x}\cdot 2\cdot\sin x.\cos x$

$\frac{\cos^2x-\sin^2x}{\cos^2x}\cdot\cos2x + 4.\sin^2x$

$\frac{\cos2x.\cos2x}{\cos^2x} + 4.\sin^2x$

$= \frac{\cos^2 2x + 4.\sin^2x.\cos^2x}{\cos^2x} = \frac{\cos^2 2x + \sin^2 2x}{\cos^2x}$

$= \frac{1}{\cos^2x} = \sec^2x$

Cevap: D

15. $f(x) = x^2\ln x$

$f^{I}(x) = 2x.\ln x + \frac{1}{2}\cdot x^2$

$f^{I}(x) = 2x.\ln x + x$

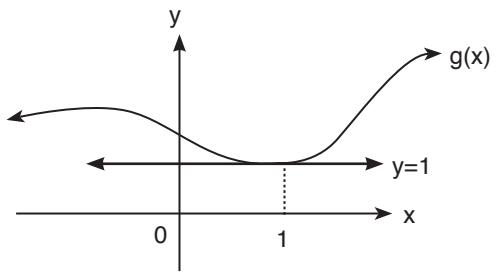
$f^{II}(x) = 2.\ln x + \frac{1}{x}\cdot 2x + 1$

$= 2\ln x + 3$

$f^{II}(1) = 2\ln1 + 3 = 3$

Cevap: D

16.



$f(x) = \sin(\pi x).g(x)$

$f'(x) = \pi.\cos(\pi x).g(x) + g'(x).\sin(\pi x)$

$f'(1) = \pi.\cos(\pi).g(1) + g'(1).\sin(\pi)$

$= -\pi.1 + 0.0 = -\pi$

Cevap: B

17. $f(x) = \dfrac{(e^x - 1)(e^x + 1)}{e^x - 1}$

$f(x) = e^x + 1$

$f(\ln x) = e^{\ln x} + 1$

$= x + 1$

Cevap: B

18. $f(x) = (2a + x)(2a - x)(4a^2 + x^2)$

$f(x) = (4a^2 - x^2)(4a^2 + x^2)$

$f(x) = 16a^6 - x^4$

$f'(x) = -4x^3$

Cevap: D

19. $\dfrac{xy + y^2}{x^2 - xy} = \dfrac{1}{3} \Rightarrow 3xy + 3y^2 = x^2 - xy$

$3xy + 3y^2 - x^2 + xy = 0$

$\dfrac{Fx}{Fy} = -\dfrac{3y - 2x + y}{3x + 6y + x} = \dfrac{2x - 4y}{4x + 6y} = \dfrac{x - 2y}{2x + 3y}$

Cevap: D

20. $\dfrac{d[5x^2 - 2x + 3]}{dx} = 10x - 2$

$\dfrac{d[10x - 2]}{dx} = 10$

Cevap: E