MATH 12002
Answers to
Derivative & Integral Problems

Derivatives:

1. $y' = \dfrac{1}{\cos x} \cdot (-\sin x)$

2. $y' = 2x \ln(1 - x^2) + x^2 \cdot \dfrac{1}{1 - x^2} \cdot (-2x)$

3. $y' = \dfrac{1}{2}(\ln x)^{-1/2} \cdot \dfrac{1}{x}$

4. $y' = \dfrac{1}{x^3 - 2} \cdot (3x^2 - 2x)$

5. $y' = \dfrac{2}{3}\left[\dfrac{1}{x^2 + 2} \cdot 2x - \dfrac{1}{x^2 + 3} \cdot 2x\right]$

6. $y' = \dfrac{\frac{1}{x}(1 + x^2) - 2x \ln x}{(1 + x^2)^2}$

7. $y' = \dfrac{1}{\tan 2x} \cdot (\sec^2 2x) \cdot 2$

8. $y' = \cos(\ln 2x) \cdot \dfrac{1}{2x} \cdot 2 = \dfrac{\cos(\ln 2x)}{x}$

9. $y' = \dfrac{1}{\sqrt{2}x} \cdot \sqrt{2} = \dfrac{1}{x}$

10. $y' = e^{\sqrt{x}} \cdot \frac{1}{2}x^{-1/2} = \dfrac{e^{\sqrt{x}}}{2\sqrt{x}}$

11. $y' = (\ln 7)7^{x^4} \cdot 4x^3$

12. $y' = 2xe^x + x^2e^x$

13. $y' = (\sin x)^x \cdot \left[\ln(\sin x) + x \cdot \dfrac{1}{\sin x} \cdot \cos x\right]$

14. $y' = \dfrac{1}{e^x + 2x} \cdot (e^x + 2)$

15. $y' = e^{-1/x} \cdot \dfrac{1}{x^2}$

16. $y' = x^{\ln x}\left(2(\ln x) \cdot \dfrac{1}{x}\right)$

17. $y' = (x^e)^x \cdot e(\ln x + 1)$

18. $y' = \dfrac{e^x(e^x + 1) - e^x e^x}{(e^x + 1)^2} = \dfrac{e^x}{(e^x + 1)^2}$

19. $y' = \dfrac{1}{1 + (x^2)^2} \cdot 2x = \dfrac{2x}{1 + x^4}$

20. $y' = \dfrac{1}{\sqrt{1 - x^2}} \cdot \ln x + (\sin^{-1} x) \cdot \dfrac{1}{x}$

21. $y' = 2(\sin^{-1} x) \cdot \dfrac{1}{\sqrt{1 - x^2}}$

22. $y' = \dfrac{1}{\sin^{-1} x} \cdot \dfrac{1}{\sqrt{1 - x^2}}$

23. $y' = 2x \tan^{-1} x + (1 + x^2) \cdot \dfrac{1}{1 + x^2}$
$= 2x \tan^{-1} x + 1$

24. $y' = -\dfrac{1}{\sqrt{1 - (2x - 1)}} \cdot \dfrac{1}{2}(2x - 1)^{-1/2} \cdot 2$

25. $y' = \dfrac{1}{1 + \sin^2 x} \cdot \cos x$

26. $y' = -(\tan^{-1} x)^{-2} \cdot \dfrac{1}{1 + x^2}$