

Math 101 Assignment 0 (Sections A01 and A02)

DUE: Wednesday, January 14, at start of lecture. Late assignments will not be accepted.

Find the derivative of each of the following functions at the given point. Provided answers are correct. Show the details of calculations required to obtain the answers .

Example 0: $F(x) = x \cos(x^2)$ at point $x = \pi$

Answer: $F'(\pi) = 7.59112$

Work:

Using product and chain rules: $F'(x) = \cos(x^2) + x(-\sin(x^2) \cdot 2x) = \cos(x^2) - 2x^2 \sin(x^2)$.
Therefore, $F'(\pi) = \cos(\pi^2) - 2\pi^2 \sin(\pi^2) = 7.591120208$

1. $f(t) = \frac{t^2 + t^3 - 1}{t^4}$ at point $t = 0.2$

Answer: $f'(0.2) = 12,225$

2. $y = \frac{1}{3\sqrt{x}} + \frac{1}{4}$ at point $x = 2$.

Answer: $y'(2) = -0.05892556$

3. $f(t) = 2t^3 - 4t^2 + 3t - 1$ at point $t = -1$.

Answer: $f'(-1) = 17$

4. $y = \sqrt{x} - \left(\frac{1}{2}\right)^x$ at point $x = 4$.

Answer: $y'(4) = 0.293321698$

5. $y = x^{(\pi^2)} + (\pi^2)^x$ at point $x = 3$.

Answer: $y'(3) = 170,536.88$

6. $f(z) = \ln(3)z^2 + \ln(4)e^z$ at point $z = -2$.

Answer: $f'(-2) = -4.206834615$

7. $f(\theta) = 4^{\sqrt{\theta}}$ at point $\theta = 16$.

Answer: $f'(16) = 44.36141956$

8. $z = \tan(e^{-3\theta})$ at point $\theta = \pi/3$.

Answer: $z'(\frac{\pi}{3}) = -0.129884$

9. $y = e^\theta \sin(2\theta)$ at point $\theta = \pi/6$.

Answer: $y'(\pi/6) = 3.15002$

10. $f(\theta) = \ln(\cos(\theta))$ at point $\theta = \pi/4$.

Answer: $f'(\pi/4) = -1$

11. $f(t) = \ln(\ln(t)) + \ln(\ln(2))$ at point $t = 2e$.

Answer: $f'(2e) = 0.1086377$

12. $g(z) = \frac{1}{\ln(z)}$ at point $z = 2$.

Answer: $g'(2) = -1.040684$

13. $f(t) = 2te^t - \frac{1}{\sqrt{t}}$ at point $t = 4$.

Answer: $f'(4) = 546.044$

Find the definite integrals below. Provided answers are correct. Show the details of calculations required to obtain the answers . Specifically write out the change of variables, if used.

14. $\int_5^{10} \left(\frac{3}{t} - \frac{2}{t^2} \right) dt$

Answer: 1.87944

15. $\int_{\pi/5}^{\pi/3} (3 \cos(\varphi) + 3\sqrt{\varphi}) d\varphi$

Answer: 1.981878

16. $\int_{0.1}^2 \left(\frac{x^2 + x + 1}{x} \right) dx$

Answer: 6.89073

$$17. \int_{\pi/4}^{3\pi/4} (3 \cos(x) - 7 \sin(x)) dx$$

Answer: -9.89949

$$18. \int_{\pi/4}^{3\pi/4} \frac{1}{\cos^2(x)} dx$$

Answer: -2

$$19. \int_0^{\pi/2} e^{\sin(x)} \cos(x) dx$$

Answer: 1.71828

$$20. \int_0^{\pi/4} (\sin(t) + \cos(t)) dt$$

Answer: 1

$$21. \int_0^{\pi} \sin(\theta) (\cos(\theta) + 5)^7 d\theta$$

Answer: 201,760

$$22. \int_{-12}^0 \frac{1}{\sqrt{4-x}} dx$$

Answer: 4

$$23. \int_0^{0.6} x e^{-x^2} dx$$

Answer: 0.15116

$$24. \int_0^{\sqrt{2}} \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$$

Answer: 0.77849

25. $\int_{0.1}^{3.1} \frac{[\ln(z)]^2}{z} dz$
Answer: 4.55211

26. $\int_0^1 \frac{1}{x^2 + 2x + 1} dx$
Answer: 0.5

27. $\int_{-2}^0 \frac{2x + 4}{x^2 + 4x + 5} dx$
Answer: 1.60944

28. $\int_0^{0.5} \frac{x}{\sqrt{1 - x^2}} dx$
Answer: 0.13397