

MTH 1126 Practice Test #1 - Answers

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Name _____

Solutions appear on the SOLUTIONS page.

1. $\int (5x^4 + 4x^3 + 6x + 6) dx = x^5 + x^4 + 3x^2 + 6x + C$

2. $\int (\sin(x) + \sec(x) \tan(x)) dx = -\cos(x) + \sec(x) + C$

3. $\int_{x=1}^{x=2} (6x^3 + 4x^2 + 4x) dx = \frac{227}{6}$

4. $\int (8x^3 + 12x^2)^{10} (x^2 + x) dx = \frac{1}{264} (8x^3 + 12x^2)^{11} + C$

5. $\int \sin(x^3 + 3x^2) (6x^2 + 12x) dx = -2 \cos(x^3 + 3x^2) + C$

6. $\int \frac{x+1}{3x^2+6x} dx = \frac{1}{6} \ln|3x^2 + 6x| + C$

7. $\frac{d}{dx} [\ln(\sin(x))] = \frac{\cos(x)}{\sin(x)} = \cot(x)$

8. $\frac{d}{dx} [\ln(3x^3 - 9x + 5)] = \frac{9x^2 - 9}{3x^3 - 9x + 5}$

9. $\frac{d}{dx} \left[\ln \left(\sqrt{\frac{x^2-1}{x}} \right) \right] = \frac{x}{x^2-1} - \frac{1}{2x}$

Alternatively:

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

10. $\int_{x=-1}^{x=1} (x^2 - 3x + 1)^3 (8x - 12) dx = -624$

11. $\frac{d}{dx} [e^{\cos(x)}] = -\sin(x) e^{\cos(x)}$

12. $\int \frac{e^x}{\sqrt{4-e^{2x}}} dx = \sin^{-1} \left(\frac{e^x}{2} \right) + C$

13. ~

(a) $\ln(10) \approx 2.3$

(b) $\ln(50) \approx 3.9$

14. $\int e^{3x^2} x dx = \frac{1}{6} e^{3x^2} + C$

15. $\frac{d}{dx} [\tan^{-1}(\sin(x))] = \frac{\cos(x)}{1+\sin^2(x)}$

16. $z = \sqrt{1 - 4x^2}$

$$17. \int \frac{4x^2}{(4x^3+6)^{\frac{3}{2}}} dx = -\frac{2}{3} (4x^3+6)^{-\frac{1}{2}} + C$$

$$18. z = \sqrt{1+x^2}$$

$$19. \frac{d}{dx} [\arccos(3x-\pi)] = -\frac{3}{\sqrt{1-(3x-\pi)^2}}$$

$$20. \int_{x=0}^{x=1} \frac{1}{\sqrt{4-x^2}} dx = \frac{\pi}{6}$$

$$21. \int \frac{\sec^2(x)}{\sqrt{\tan^3(x)}} dx = -2(\tan(x))^{-\frac{1}{2}} + C = -\frac{2}{\sqrt{\tan(x)}} + C$$

$$22. \frac{d}{dx} [e^{\tan(3x^2)}] = 6x \sec^2(3x^2) e^{\tan(3x^2)}$$

$$23. \int e^{(2x^2+7)} x dx = \frac{1}{4} e^{(2x^2+7)} + C$$

$$24. \frac{d}{dx} [\sin^{-1}(\sqrt{x})] = \frac{1}{2\sqrt{x-x^2}}$$

$$25. z = \frac{\sqrt{r^2-(x-h)^2}}{r}$$

$$26. \frac{d}{dx} [\arctan(3x^2)] = \frac{6x}{1+9x^4}$$

$$27. \int \frac{e^{2x}}{4+e^{4x}} dx = \frac{1}{4} \arctan\left(\frac{e^{2x}}{2}\right) + C$$

$$28. \int_{x=\frac{2}{\sqrt{3}}}^{x=2} \frac{1}{x\sqrt{x^2-1}} dx = \frac{\pi}{6}$$