MTH 1126 - Practice Test #3 - Answers

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Instructions. Show CLEARLY how you arrive at your answers.

1. $\int \frac{\ln(\sqrt{x})}{\sqrt{x}}\,dx = 2\left(x^{\frac{1}{2}}\ln\left(x^{\frac{1}{2}}\right) - x^{\frac{1}{2}}\right) + C$

2. $\int \frac{\ln(\sqrt{x})}{\sqrt{x}}\,dx = 2x^{\frac{1}{2}}\ln\left(x^{\frac{1}{2}}\right) - 2x^{\frac{1}{2}} + C$

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

4. $\int \sin^3(x)\cos^4(x)\,dx = \frac{1}{7}\cos^7(x) - \frac{1}{5}\cos^5(x) + C$

5. $\int xe^{2x}dx = \frac{1}{2}xe^{2x} - \frac{1}{4}e^{2x}dx + C$

6. $\int x^2e^{3x}dx = \frac{1}{3}x^2e^{3x} - \frac{2}{9}xe^{3x} + \frac{2}{27}e^{3x} + C$

7. $\int e^x\sin(x)\,dx = -\frac{1}{2}e^x\cos(x) + \frac{1}{2}e^x\sin(x) + C$

8. $\int \cos^3(x)\sin^4(x)\,dx = \frac{1}{5}\sin^5(x) - \frac{1}{7}\sin^7(x) + C$

9. $\int \sin^3(x)\,dx = \frac{1}{3}\cos^3(x) - \cos(x) + C$

10. $\int \sin^2(x)\cos^2(x)\,dx = \frac{1}{8}x - \frac{1}{32}\sin(4x) + C$

11. $\int \tan^3(x)\sec^3(x)\,dx = \frac{1}{5}\sec^5(x) - \frac{1}{3}\sec^3(x) + C$

12. $\int \tan^3(x)\sec^4(x)\,dx = \frac{1}{6}\tan^6(x) + \frac{1}{4}\tan^4(x) + C$

    Alternatively: $\int \tan^3(x)\sec^4(x)\,dx = \frac{1}{6}\sec^6(x) - \frac{1}{4}\sec^4(x) + C$

13. $\int \frac{1}{\sqrt{9+4x^2}}dx = \frac{1}{2}\ln\left|\sqrt{9+4x^2} + 2x\right| + C$

14. $\int \frac{\sqrt{x^2-9}}{x}dx = \sqrt{x^2-9} - 3\sec^{-1}\left(\frac{x}{3}\right) + C$

15. $\int \frac{11x+2}{2x^2-5x-3}dx = \frac{1}{2}\ln|2x+1| + 5\ln|x-3| + C$

16. $\int \frac{4x^2+x+1}{(x^2+1)(x-1)}dx = \frac{1}{2}\ln|x^2+1| + 2\tan^{-1}(x) + 3\ln|x-1| + C$

17. $\lim_{x\to 0} \frac{\cos(x)+2x-1}{3x} = \frac{2}{3}$

18. $\lim_{x\to \frac{\pi}{2}^-} \frac{4\tan(x)}{1+\sec(x)} = 4$

19. $\lim_{x\to 0} \frac{e^x+e^{-x}}{x^2} = \infty$

20. $\lim_{x\to 0^+} x^2 \ln(x) = 0$

21. $\lim_{x\to 0^+} (1+3x)^{\frac{1}{2x}} = e^{\frac{3}{2}}$

22. $\lim_{x\to 0^+} \left(\frac{1}{e^x-1} - \frac{1}{x}\right) = -\frac{1}{2}$