Mat 115 Worksheet 4
Thursday, Oct 12 2017

Name:

Important info: Welcome to the mat 115 workshops! My name is **Diego Avalos** (avalosgalvez@cpp.edu), and I will be your workshop facilitator. We meet on Tuesdays and Thursdays from 4 to 5:50 pm. My office hour is on Mondays from 11:30 am to 12:30 pm in room 3-2117. All worksheets and solutions may be found at the website **www.diegoavalos.net/teaching/mat115workshop2017**.

Solve the juicy integrals 1 to 27 using substitution.

1. $\int \sqrt{2x+1}\,dx$
2. $\int x\sqrt{1+3x}\,dx$
3. $\int x^2\sqrt{x+1}\,dx$
4. $\int_{-2/3}^{1/3} \dfrac{x}{\sqrt{2-3x}}\,dx$
5. $\int \dfrac{x+1}{(x^2+2x+2)^3}\,dx$
6. $\int \sin^3 x\,dx$
7. $\int x(x-1)^{1/3}\,dx$
8. $\int \dfrac{\cos x}{\sin^3 x}\,dx$
9. $\int_0^{\pi/4} \cos 2x\sqrt{4-\sin 2x}\,dx$
10. $\int \dfrac{\sin x}{(3+\cos x)^2}\,dx$
11. $\int \dfrac{\sin x}{\sqrt{\cos^3 x}}\,dx$
12. $\int_3^8 \dfrac{\sin\sqrt{x+1}}{\sqrt{x+1}}\,dx$
13. $\int x^{n-1}\sin x^n\,dx,\ n\neq 0$
14. $\int \dfrac{x^5}{\sqrt{1-x^6}}\,dx$
15. $\int x(1+x)^{1/4}\,dx$
16. $\int (x^2+1)^{-3/2}\,dx$
17. $\int x^2(8x^3+27)^{2/3}\,dx$
18. $\int \dfrac{\sin x+\cos x}{(\sin x-\cos x)^{1/3}}\,dx$
19. $\int \dfrac{x}{\sqrt{1+x^2+\sqrt{(1+x^2)^3}}}\,dx$
20. $\int \dfrac{(x^2+1-2x)^{1/5}}{1-x}\,dx$
21. $\int_0^{e^2-1} \dfrac{1}{1+x}\,dx$
22. $\int \dfrac{1}{x\ln x}\,dx$
23. $\int_0^{1-e^{-2}} \dfrac{\ln(1-x)}{1-x}\,dx$
24. $\int \dfrac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$
25. $\int_0^{\ln\sqrt{3}} \dfrac{e^x}{1+e^{2x}}\,dx$
26. $\int \dfrac{\sqrt{e^x+e^{-x}+2}}{e^{-x/2}}\,dx$
27. $\int_0^{\pi/2} \sin^4 x\,dx$

28. (a) Show that

$$\int_0^{\pi} xf(\sin x)\,dx = \frac{\pi}{2}\int_0^{\pi} f(\sin x)\,dx \qquad \text{(Hint: } u=\pi-x\text{)}.$$

(b) Use part (a) to find the value of

$$\int_0^{\pi} \frac{x\sin x}{1+\cos^2 x}\,dx.$$

29. If m is a positive integer, show that

$$\int_0^{\pi/2} \cos^m x\sin^m x\,dx = 2^{-m}\int_0^{\pi/2} \cos^m x\,dx.$$