Name:

Mat 115 Worksheet 2
Thursday, Oct 5 2017

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**.

Compute the indefinite integrals in problems 1 to 12.

1. $\int \sec^2(4x)\,dx$
2. $\int \csc(2x)\cot(2x)\,dx$
3. $\int \sin(x)+\cos(\pi x)\,dx$
4. $\int \sec(2y)\tan(2y)-\csc^2(6y)\,dy$
5. $\int \frac{\pi}{x^3}+9e^x\,dx$
6. $\int \cos(\frac{x}{7})-\cos(\frac{x}{\pi})\,dx$
7. $\int \frac{1}{\sqrt{16-x^2}}\,dx$
8. $\int \frac{2x^2-5}{1+x^2}\,dx$
9. $\int 2\sin(3\theta)\cos(3\theta)\,d\theta$
10. $\int x^{-5/3}+x^e+\frac{1}{x}\,dx$
11. $\int \frac{1}{x\sqrt{x^2-64}}\,dx$
12. $\int \frac{t^\pi+t\cos(2\pi t)-1}{t}\,dt$

13. Solve $u'(x)=\dfrac{e^{2x}+4e^{-x}}{e^x}$, $u(\ln 2)=2$.

14. Given the following acceleration functions of an object moving along a line, find the position function $s(t)$ with the following initial velocity and position
$$a(t)=-t;\quad v(0)=50;\quad s(0)=20.$$

15. Approximate the integral
$$\int_1^5 \frac{1}{\sqrt{x}}\,dx$$
using a left-Riemann sum with $n=4$ rectangles.

16. Use (a) a left-Riemann sum, (b) a right-Riemann sum, and (c) a midpoint-Riemann sum with $n=3$ rectangles to approximate the following integral
$$\int_0^3 4-x^2\,dx.$$
The exact value of the integral above is 3. Which approximation was best?

Find the definite integrals in problems 17 to 20 using geometry

17. $\int_0^2 |x-1|+1\,dx$
18. $\int_{-4}^{-2} \frac{|x|}{x}\,dx$
19. $\int_0^5 \sqrt{25-x^2}\,dx$
20. $\int_{-3}^1 \sqrt{4-(x+1)^2}\,dx$

21. Evaluate the sum
$$\sum_{k=15}^{100} k.$$

22. If $\int_{-2}^0 f(x)\,dx=5$ and $\int_0^3 f(x)\,dx=-7$, compute
    a. $\int_{-2}^3 -4f(x)\,dx$
    b. If f takes on positive values on $[-2,0)$ and negative values on $(0,3]$, find $\int_{-2}^3 |f(x)|+\pi\,dx$

23. Given that $\int_0^\pi \sin x\,dx=2$, answer the following questions.
    a. What is $\int_0^{3\pi} |\sin x|\,dx$?
    b. What is $\int_0^{5\pi/2} |\sin x|\,dx$?
    c. Compute
$$\lim_{n\to\infty} \frac{1}{n\pi+1}\int_0^{n\pi} |\sin x|\,dx.$$

24. (Thanks to Hunter for bringing this integral to me.) Compute
$$\int_{1/\pi}^{1/2} \ln\lfloor\frac{1}{x}\rfloor\,dx.$$