Mat 115 Worksheet 5
Tuesday, Oct 17 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**.

1. Let $H(x) = \int_0^x \sqrt{4-t^2}\,dt$, for $-2 \le x \le 2$.
   (a) Evaluate $H(0)$
   (b) Evaluate $H'(1)$
   (c) Evaluate $H'(2)$
   (d) Use geometry to evaluate $H(2)$.
2. At $t = 0$, a train approaching a station begins decelerating from a speed of 80 mi/hr according to the acceleration function $a(t) = -1280(1+8t)^{-3}$, where $t \le 0$ is measured in hours. How far does the train gravel between $t = 0$ and $t = 0.2$? Between $t = 0.2$ and $t = 0.4$?
3. Find the position and velocity of an object moving along a straight line with the given acceleration, initial velocity, and initial position.
$$a(t) = \cos 2t, \quad v(0) = 5, \quad s(0) = 7.$$

For problems 4 to 8, sketch the region and find its area.

4. The region bounded by $y = 2(x+1)$, $y = 3(x+1)$ and $x = 4$.
5. The region bounded by $y = e^x$, $y = e^{-2x}$, and $x = \ln 4$.
6. The region bounded by $y = \dfrac{2}{1+x^2}$ and $y = 3x^2$.
7. The region bounded by $y = \sin x$, $y = \cos x$, and the x-axis between $x = 0$ and $x = \pi/2$.
8. The region bounded by $y = (x-1)^2$ and $y = 7x - 19$.

Evaluate the following integrals

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