Answers to Dr. Z.'s Five Practice Exams for Exam 1 (that will take place Oct. 18, 2012)

Disclaimer: Not responsible for any errors!

Prize: One dollar to the **first** person to point out an error. If the proposed correction is wrong, i.e. if I was right, the person has to pay me 10 cents.

Version of Oct. 17, 2012, 10:20am : Thanks to Taylor Picillo who won a dollar (**4**#5 previously had the wrong coefficient in front of the middle term $\csc^2 x \cot x$, it now has been corrected)

out that the previous answer of **3**#1 was to the *indefinite* integral. She won a dollar!

Previous corrections (thanks to Le Kim who won almost a dollar (in fact 99 cents), leading to a discovery of a typo in **3**#6 (I previously has $\frac{4}{2\pi}$ instead of the correct $\frac{4}{3\pi}$)

15, 2012, 10:25am : Thanks to Stacy that pointed out that the previous answer of **3**#1 was to the *indefinite* integral. She won a dollar!

Oct. 16, 2012, 9:10am : Thanks to TA Sjuvon Chung (correcting **5**#4.

Oct. 16, 2012, 4:40pm : Thanks Taylor P. and Patrick M. (correcting a typo in **3**#1, this is the second correction of this answer, before I gave the definite integral, and then I had a typo and put $\frac{5\pi}{6}$ instead of the correct $\frac{5\pi}{16}$.

Oct. 17, 2012, 9:40am : Thanks to Eunhee Kim who won a dollar (**4**#3(a) previously had the wrong answer $\frac{158}{3}\pi$, it now has been corrected to $\frac{152}{3}\pi$)

Practice Exam 1

(available from http://www.math.rutgers.edu/~zeilberg/calc2_2012/mt1P1.pdf)

1.(a) $(x^2 - 2x + 3)e^x$ (b) $-\frac{3}{2(x-2)} + \frac{1}{4}\ln|x| - \frac{1}{4}\ln|x-2| + C$

2.$\frac{800}{3}$ (or $266\frac{2}{3}$)

3. $\frac{32}{3}$ (or $10\frac{2}{3}$).

4.$\frac{128}{3}$ (or $42\frac{2}{3}$)

5.$\frac{1}{10}$; $\frac{29}{200}$; the ave of the max and min is larger than the average of the function .

6. $\tan^{-1} x + \ln|x+3| + C$.

7. $-\frac{\sqrt{4-y^2}}{4y} + C$.

8. $\frac{1}{5}e^{2x}(2\sin x - \cos x) + C$, $\frac{1}{5}e^{2x}(\sin x + 2\cos x) + C$.

9. (a) $\ln|\sqrt{x^2+6x+10}+x+3|+C$ (b) $-\frac{1}{9}\cos^9 x+\frac{1}{11}\cos^{11} x+C$.

10. $\frac{1}{3}\tan^3 x-\tan x+x+C$.

Practice Exam 2

(available from http://www.math.rutgers.edu/~zeilberg/calc2_2012/mt1P2.pdf)

1. $\frac{3\sqrt{3}}{4}$

2. (a) $\frac{21}{8}$ (or $2\frac{5}{8}$) (b)$\frac{1}{24}$.

3. (a) $\frac{2048}{11}\pi$ (b) $\frac{256}{7}\pi$

4. $\frac{768}{7}\cdot 2^{\frac{5}{6}}$.

5. (a) divergent (b) divergent .

6. $\frac{x^3}{3}-x^2+6x-17\ln|x+3|+C$.

7. (a) 68 (b) 8 .

8. (a) $\frac{1}{2}\tan x\sec x+\frac{1}{2}\ln|\sec x+\tan x|+C$ (b) $4x\ln x-\frac{7x}{2}+\frac{x^3}{3}+\frac{\sin 2x}{4}+C$.

9. $2\ln|x+3|-\ln|x+5|-\frac{2}{3}\ln|3x-2|+C$.

10. $\frac{512\pi}{15}$.

Practice Exam 3

(available from http://www.math.rutgers.edu/~zeilberg/calc2_2012/mt1P3.pdf)

1. $\frac{5\pi}{16}$ (corrected, thanks to Stacy, 10/15/12, the previous posted answer was of the *indefinite* integral, corrected again (I had a typo before, 10/16/12, thanks to Taylor P. and Patrick M.).

2. $\frac{3}{10}\pi$.

3. $\frac{3}{10}\pi$.

4. $\frac{s}{8(s^2+4)}+\frac{1}{16}\tan^{-1}\frac{s}{2}+C$.

5. (a) convergent, 6 (b) divergent

6.(corrected Oct. 13, 2012, 10:12am, thanks to Le Kim) $\frac{4}{3\pi}$ (appx. 0.42); $\frac{1}{2}=0.5$, smaller.

7. (a) convergent, $\frac{5}{3}$ (b) convergent, too complicated to evaluate by either human or computer.

8. $\frac{7}{3}$; 3; smaller.

9. $\frac{1225}{8}$ (or $153\frac{1}{8}$) .

10. $2\ln 2 + \frac{2}{\ln 2} - 4$.

Practice Exam 4

(available from http://www.math.rutgers.edu/~zeilberg/calc2_2012/mt1P4.pdf)

1. $\frac{2261}{2700}$ (b) $\frac{8}{3}$.

2. (a) $\frac{1}{3}x^3 \tan^{-1} x + \frac{1}{6}\ln(1+x^2) - \frac{1}{6}x^2 + C$ (b) $x(\ln x)^3 - 3x(\ln x)^2 + 6x\ln x - 6x + C$

3. (a) $\frac{152\pi}{3}$ (corrected by Eunhee Kim, who won a dollar) (b) $\frac{152\pi}{3}$

4. 2 .

5. $-\frac{1}{5}\cot x \csc^4 x - \frac{4}{15}\cot x \csc^2 x - \frac{8}{15}\cot x + C$

6. (a) $2xe^{\sqrt{x}} - 4\sqrt{x}e^{\sqrt{x}} + 4e^{\sqrt{x}} + C$ (b) $\frac{1}{2}(\ln x)^2 \ln(\ln x) - \frac{1}{4}(\ln x)^2 + C$.

7.(a) convergent, $\frac{3}{2}$ (b) convergent, 18 .

8. $\frac{e^2+1}{4(e-1)}$.

9. (a) $\frac{1}{6}\sec^2(3x) + C$ (b) $\frac{1}{6}\cos^2(s^2)\sin(s^2) + \frac{1}{3}\sin(s^2) + C$.

10. (a) $\frac{142}{105}$ (or $1\frac{37}{105}$) (b) $\frac{1}{4}$.

Practice Exam 5

(available from http://www.math.rutgers.edu/~zeilberg/calc2_2012/mt1P5.pdf)

1. (a) $50\sin^{-1}\frac{x}{10} + \frac{1}{2}x\sqrt{100-x^2} + C$ (b) $\frac{1}{10}\sin^{10} x - \frac{1}{12}\sin^{12} x + C$.

2. $-\frac{1}{4}\sin^3 x\cos x - \frac{3}{8}\sin x\cos x + \frac{3}{8}x + C$.

3. (a) $-\frac{5}{9} + \frac{2}{9}e^{-3}$ (b) diverges (since $\lim_{x\to 0^+}\ln x = -\infty$).

4. $\frac{\sqrt{3}}{3}\cdot 4000$. (corrected Oct. 16, 2012, thanks to TA Sjuvon Chung)

5. $\pi - 2$.

6. $c = \frac{3}{5^{1/4}}$ (or $c = \frac{35^{3/4}}{5}$).

7. 2π .

8. $\tan^{-1} x + \ln(x^2+4) + C$.

9. (a) $\frac{1216}{3375}$ (b) 1 .

10. Compare with $\frac{1}{x}$; Compare with $x^3 e^{-x^4}$.