Calculus 2
Review Answer Key for Exam 1

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Problem #	Hint	Answer
1	Add the areas noting their respective signs	$G(5) = 10$, $g_{avg} = 2$
2.a		False
2.b		False
2.c		False
3.a		True
3.b		False
3.c		False
4	Use the averages to find the integrals	$\frac{58}{8}$
5.a	$\int_{-a}^{a} f(x)dx = 0$ if $f(x)$ is odd	-20
5.b	$\int_{-a}^{a} f(x)dx = 2\int_{0}^{a} f(x)dx$ if $f(x)$ is even	26
5.c	$\int_{-a}^{a} f(x)dx = 2\int_{0}^{a} f(x)dx$ if $f(x)$ is even	$\frac{1}{2}\int_{-7}^{7} f(x)dx - \int_{5}^{7} f(x)dx$
6.a	**Area** $= \pi r^2$ for a circle of radius r	0
6.b		0
6.c	**Area** $= \int_0^4 \lvert f(x)\rvert dx$	π
6.d	**Area** $= \int_0^4 \lvert f(x)\rvert dx$	π
6.e	$u = x - 1$	0
6.f	$f(x) = \sqrt{1-(x-1)^2}$	$\frac{4}{3}$
7	Use a rectangle and triangle to estimate	$\frac{1}{2} \leq \frac{1}{\pi}\int_0^{\pi} f(x)dx \leq 1$
8.a	$v(t)$ is monotonically increasing, find $\mathbf{R}_5$	704
8.b	$v(t)$ is monotonically increasing, find $\mathbf{L}_5$	528

8.c	$\lvert\mathbf{R}_n - \mathbf{L}_n\rvert = \Delta t \lvert v(t_n) - v(t_0)\rvert$	88
9	Use the Second Fundamental Theorem of Calculus	$\frac{2\sqrt{82}}{3}$
10	Find where the second derivative is positive	$\left[-\infty, -\frac{1}{2}\right]$
11	Use the product rule	$\frac{4}{\sqrt{\pi}} x \int_0^x e^{-t^2} dt + \frac{2}{\sqrt{\pi}} e^{-x^2}$
12.a	Use the Second Fundamental Theorem of Calculus	$\ln(x)$
12.b	Use the Second Fundamental Theorem of Calculus	$4xe^{x^4}$
12.c	Use the Second Fundamental Theorem of Calculus	$x^2 \sin(x^2)$
12.d	Use the product rule	$2x \int_\pi^x \sin(t^2) dt + x^2 \sin(x^2)$
13	Split the integral and use geometry to evaluate	$\frac{9\pi+24}{20}$
14	Use the power rule	$\frac{2}{7} t^{\frac{7}{2}} + 2t^{\frac{1}{2}} + 2et + C$
15	Use the power rule	$\frac{113}{8} - 4e^3$
16	Split the integral and use geometry to evaluate	$\frac{58+25\pi}{4}$
17	$u = x + 2$	$\frac{(x+2)^4}{4} + C$
18	Distribute and use power rule	$\frac{6}{13} x^{\frac{13}{6}} + \frac{6}{11} x^{\frac{11}{6}} - \frac{4}{3} x^{\frac{3}{2}} + C$
19	$u = x^4 + 5$	$\frac{1}{4} e^{x^4+5} + C$
20	$u = \sin(\theta)$	$e - 1$
21	$u = t + 1$	$\frac{2}{3}(t+1)^{\frac{3}{2}} - 2(t+1)^{\frac{1}{2}} + C$
22	$u = 2x + 1$	$\frac{1}{2}(2x+1)^{\frac{3}{2}}$ $-\frac{7}{2}(2x+1)^{\frac{1}{2}} + C$
23	$u = \ln(x)$	$\frac{\ln^3(x)}{3} + C$
24	$u = \ln(x)$ and $dv = x^{-2} dx$	$-\frac{\ln(x)+1}{x} + C$
25	$u = \ln(x)$ and $dv = (x^2 + x) dx$	$\left(\frac{x^3}{3} + \frac{x^2}{2}\right) \ln(x)$ $-\left(\frac{x^3}{9} + \frac{x^2}{4}\right) + C$
26	$u = \ln(5x + 8)$ and $dv = dx$	$x \ln(5x + 8)$ $-\frac{1}{5}(5x - 8 + 8 \ln\lvert 5x - 8\rvert) + C$

27	$u = \ln^2(x)$ and $dv = dx$	$x\ln^2(x) - 2x\ln(x) - 2x + C$
28	Expand and use power rule	$t + 2\ln\lvert t\rvert - t^{-1} + C$
29	$u = x^2$	$\frac{1}{2}(e^4 - e)$
30	$u = t + 7$	$\frac{1}{40}$
31	$u = e^x$	$\ln\lvert 1 + e^x\rvert + C$
32	$u = e^x$	$\arctan(e^x) + C$
33	$u = e^x$	$\frac{1}{a}\arctan\left(\frac{e^x}{a}\right) + C$
34	$u = z^2$ and $dv = e^z dz$	$z^2 e^z - 2ze^z + 2e^z + C$
35	$u = z$ and $dv = e^{-2z} dz$	$\frac{1}{4} - \frac{3}{4}e^{-2}$
36	$u = e^{2\theta}$ and $dv = \sin(3\theta)d\theta$	$\frac{2}{13}e^{2\theta}\sin(3\theta)$ $-\frac{9}{39}e^{2\theta}\cos(3\theta) + C$
37	$u = \arctan(3\theta)$ and $dv = d\theta$	$\theta\arctan(3\theta)$ $-\frac{1}{18}\ln\lvert 1 + 9\theta^2\rvert + C$
38	$u = x^2 + 1$ and $dv = e^{-x}dx$	$2 - 5e^{-1}$
39	$u = x^2$ and $dv = f''(x)dx$	-2.75
40.a	$u = 2x - 1$ and $dv = f''(x)dx$	1.8
40.b	$u = 2\sin(x)$	4