Calculus 2
Review Answer Key for Exam 3

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Problem #	**Hint**	**Answer**
1	Washer Method: $R = \sqrt{x} + 3$ & $r = x^3 + 3$	**Area** $= \frac{5}{12}$, **Volume** $= \frac{20\pi}{7}$
2	Washer Method: $R = \sqrt{x}$ & $r = x^3$	**Volume** $= \frac{5\pi}{14}$
3	Shell Method: $h(x) = -x + 3$ & $r(x) = \pi - x$	$9\pi^2 - 9\pi$
4	Taken horizontal cross sections: **Volume**$_{CS} = s^2(y)dy$	$\frac{a^2 h}{3}$
5	$h_1(y) = \sqrt{y}$, $r_1(y) = y$, $h_2(y) = (3 - \frac{y}{2} + \frac{\sqrt{y}}{2})$, $r_2(y) = y$	$\frac{250\pi}{3}$
6	$h(y) = 1 + y - (y-1)^2$ & $r(y) = y$	$\frac{27\pi}{2}$
7	$h(y) = \sqrt{y} - y^2$ & $r(y) = y + 1$	$\frac{29\pi}{30}$
8	$h(x) = x^2$ & $r(x) = x$	$\frac{15\pi}{2}$
9.a	**Arc Length** $= \int_a^b \sqrt{1 + (y'(x))^2}dx$	$\frac{335}{27}$
9.b	**Arc Length** $= \int_a^b \sqrt{1 + (y'(x))^2}dx$	$\sqrt{5} + \frac{1}{2}\operatorname{arcsinh}(2)$
10	**Arc Length** $= \int_a^b \sqrt{1 + (y'(x))^2}dx$	$3\arcsin\left(\frac{2}{3}\right)$
11		$a_n = (-1)^{n+1}\left(\frac{n-1}{n^2}\right)$ where $n \geq 2$
12		$a_n = (-1)^n\frac{\pi}{2} + \frac{\pi}{2}$ where $n \geq 1$
13		Converges: $a_n \to 0$
14		Converges: $a_n \to 1$
15	$\cos(n\pi) = (-1)^n$	Diverges: $a_n \to \{-1, 1\}$
16		Diverges: $a_n \to \infty$
17	Separate into two geometric sums	Converges: $\frac{81}{8}$
18		Diverges
19		Converges: $\frac{5e}{4-e}$

20		Converges: $\frac{128}{7}$
21	Raising a fraction to higher powers makes the value smaller	True
22	$a_n = \frac{1}{n^2}$ & $b_n = \frac{1}{n}$	False
23	Comparison Test	True
24	$a_n = \frac{1}{n}$	False
25		True
26	$a_n = 3^{\frac{2^n-1}{2^n}}$ where $n \geq 1$	Converges: $a_n \to 3$
27	Write the number as a geometric series	$\frac{3844}{999}$
28	Write the sum of the heights as a geometric series	24
29.a		Converges
29.b		Diverges
29.c		Converges
30.a	Limit Comparison Test: $b_n = \frac{1}{n}$	Diverges
30.b	Limit Comparison Test: $b_n = \frac{1}{n^{\frac{3}{2}}}$	Converges
31	Root Test	Converges
32	Alternating Series Test	Converges
33	Alternating Series Test	Converges
34	Ratio Test	Diverges
35	Ratio Test	Diverges
36	Limit Comparison Test: $b_n = \frac{1}{n^{\frac{1}{2}}}$	Diverges
37	Ratio Test	Converges
38.a	Ratio Test	$R = 5$, $[-1, 9)$
38.b	Ratio Test	$R = 1$, $(0, 2]$
38.c	Ratio Test	$R = \frac{1}{2}$, $\left[\frac{5}{2}, \frac{7}{2}\right)$
39.a	Ratio Test	$R = \frac{1}{2}$, $[0, 1]$

39.b	Ratio Test	$R = 2,\ (-4, 0)$
39.c	Ratio Test	$R = \frac{3}{2},\ \left(-\frac{5}{2}, \frac{1}{2}\right)$
40.a		True
40.b		Not Possible to Determine
40.c		Not Possible to Determine
40.d		False
40.e		False
40.f		False
40.g		False
40.h		Not Possible to Determine
40.i		Not Possible to Determine
40.j		True