Answer Key 1

MATH 10560: Calculus II **Practice Final 2** *December 17, 2009*

Record your answers to the multiple choice problems by placing an $\times$ through one letter for each problem on this page. There are 20 multiple choice questions worth 6 points each. You start with 30 points.

You may not use a calculator.

1.	a	b	c	d	•	11.	a	b	•	d	e
2.	a	•	c	d	e	12.	a	b	•	d	e
3.	a	b	c	•	e	13.	a	b	c	d	•
4.	a	b	c	d	•	14.	a	•	c	d	e
5.	a	b	c	d	•	15.	a	b	c	d	•
6.	a	b	c	•	e	16.	a	b	c	•	e
7.	a	b	c	•	e	17.	a	b	•	d	e
8.	a	b	c	d	•	18.	a	b	•	d	e
9.	a	b	c	d	•	19.	a	•	c	d	e
10.	a	•	c	d	e	20.	a	b	c	d	•

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6.	a	b	c	d	e	16.	a	b	c	d	e
7.	a	b	c	d	e	17.	a	b	c	d	e
8.	a	b	c	d	e	18.	a	b	c	d	e
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1. Determine which expression gives the length of the curve $x = t - \ln(t)$, $y = t + \ln(t)$, $1 \le t \le 2$.

(a) $\int_1^2 \sqrt{1 + \left(1 + \frac{1}{t}\right)^2}\, dt$ (b) $\int_1^2 \sqrt{2 + \frac{4}{t} + \frac{2}{t^2}}\, dt$ (c) $\int_1^2 \sqrt{1 + \left(1 - \frac{1}{t}\right)^2}\, dt$

(d) $\int_1^2 \sqrt{2t^2 + 2\ln(t)^2}\, dt$ (e) $\int_1^2 \sqrt{2 + \frac{2}{t^2}}\, dt$

2. Determine which phrase applies to the series $\sum_{n=2}^{\infty} (-1)^n \frac{\ln(n)}{n^2}$

(a) *diverges by the Divergence Test* (b) *converges absolutely*

(c) *converges by the Ratio Test* (d) *converges conditionally*

(e) *diverges by the Integral Test*

3. Evaluate $\int_0^{\infty} \frac{e^x}{e^{2x} + 1}\, dx$

(a) *diverges* (b) $\pi/2$ (c) π (d) $\pi/4$ (e) 2π

4. At 1:00 PM a bacteria colony had a population of 1000. At 1:30 PM the number was 1500. Assuming the population grows exponentially, determine its size at 2:00 PM.

(a) 1750 (b) 2000 (c) 2500 (d) 2750 (e) 2250

5. Use power series to evaluate $\int \ln(1-x^3)\,dx$.

(a) $C - \frac{1}{3}x^3 - \frac{1}{2\cdot 6}x^6 - \frac{1}{3\cdot 8}x^8 - \frac{1}{4\cdot 10}x^{10} - \cdots$

(b) $C - \frac{1}{4}x^4 - \frac{1}{2\cdot 5}x^5 - \frac{1}{3\cdot 6}x^6 - \frac{1}{4\cdot 7}x^7 - \cdots$

(c) $C - \frac{1}{2}x^2 - \frac{1}{3\cdot 5}x^5 - \frac{1}{4\cdot 8}x^8 - \frac{1}{5\cdot 11}x^{11} - \cdots$

(d) $C - x^3 - \frac{1}{2}x^6 - \frac{1}{3}x^9 - \frac{1}{4}x^{12} - \cdots$

(e) $C - \frac{1}{4}x^4 - \frac{1}{2\cdot 7}x^7 - \frac{1}{3\cdot 10}x^{10} - \frac{1}{4\cdot 13}x^{13} - \cdots$

6. Compute the second degree Taylor polynomial for $f(x) = x\cos(x)$ at $a = \frac{\pi}{2}$.

(a) $\left(x - \frac{\pi}{2}\right) - \frac{1}{2}\left(x - \frac{\pi}{2}\right)^2$

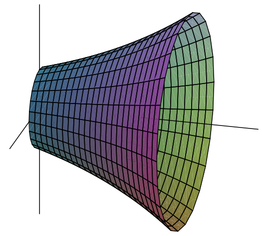
(b) $\frac{\pi}{2}\left(x - \frac{\pi}{2}\right) - \frac{\pi}{4}\left(x - \frac{\pi}{2}\right)^2$

(c) $x - \frac{1}{2}x^3$

(d) $-\frac{\pi}{2}\left(x - \frac{\pi}{2}\right) - \left(x - \frac{\pi}{2}\right)^2$

(e) $-\frac{\pi}{2}x + x^2$

7. Determine which integral gives the area of the surface obtained by rotating $y = e^x$, $0 \le x \le 1$, about the x-axis.



(a) $2\pi \int_0^1 x\sqrt{1+e^{2x}}\,dx$ (b) $2\pi \int_0^1 e^x\,dx$ (c) $2\pi \int_0^1 \sqrt{1+e^x}\,dx$

(d) $2\pi \int_0^1 e^x\sqrt{1+e^{2x}}\,dx$ (e) $2\pi \int_0^1 xe^x\,dx$

8. Evaluate $\int \frac{1}{(x^2+4)^{3/2}}\,dx$

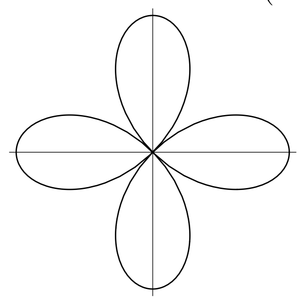
(a) $\ln|x+\sqrt{x^2+4}|+C$ (b) $\frac{1}{2\sqrt{x^2+4}}+C$ (c) $\frac{\sqrt{x^2+4}}{4x}=C$

(d) $\frac{1}{2}\ln|x-\sqrt{x^2+4}|+C$ (e) $\frac{x}{4\sqrt{x^2+4}}+C$

9. Evaluate $\int_0^\pi \sin^3(x)\cos^2(x)\,dx$.

(a) 2/15 (b) 1/3 (c) 1/15 (d) 1/5 (e) 4/15

10. Compute the area inside one petal of the rose $r = \cos(2\theta)$.



(a) π (b) $\pi/8$ (c) $\pi/2$ (d) $\pi/6$ (e) $\pi/4$

11. Find the limit $\lim_{x\to 0}(1+x)^{1/x}$

(a) ∞ (b) $1/e$ (c) e (d) 1 (e) $e-1$

12. Determine which is the best estimate for the error of approximating $\sum_{n=1}^{\infty}\frac{n}{e^{n^2}}$ using the partial sum s_4.

(a) $\frac{4}{e^{16}}$ (b) $\frac{5}{e^{25}}$ (c) $\frac{1}{2e^{16}}$ (d) $\frac{1}{e^3(e-1)}$ (e) $\frac{1}{e^{15}(e-1)}$

13. Evaluate $\int \frac{1}{\sqrt{1-x^2}}\,dx$

(a) $\tan^{-1}(x)+C$ (b) $\sec^{-1}(x)+C$ (c) $\sqrt{1-x^2}/x+C$

(d) $\sqrt{1-x^2}+C$ (e) $\sin^{-1}(x)+C$

14. Find the equation of the line tangent to the curve $x=\frac{1}{t}$, $y=t^3$ at $t=\frac{1}{2}$.

(a) $y=\frac{3}{2}x+\frac{1}{8}$ (b) $y=-\frac{3}{16}x+\frac{1}{2}$ (c) $y=\frac{5}{8}x+\frac{1}{8}$

(d) $y=-x+\frac{1}{4}$ (e) $y=-\frac{1}{4}x+\frac{1}{2}$

15. Evaluate $\int_0^{10} 10^x \, dx$

(a) $(10^{11} - 1)/11$ (b) $10^{11}/11$ (c) $10^{10} - 1$

(d) $(10^{10} - 1)\ln(10)$ (e) $(10^{10} - 1)/\ln(10)$

16. Use power series to calculate $\lim_{x \to 0} \dfrac{x^6}{\cos(2x^3) - 1}$.

(a) $3/2$ (b) $-3/4$ (c) $-5/16$ (d) $-1/2$ (e) $1/16$

17. Evaluate $\int_0^1 x^2 e^x \, dx$

(a) $e - 1$ (b) $e/2$ (c) $e - 2$ (d) e (e) $e/2 - 1$

18. Find the interval of convergence of the power series $\sum_{n=1}^{\infty} \dfrac{(x-1)^{2n}}{4^n}$.

(a) $[0, 2)$ (b) $(-4, 4)$ (c) $(-1, 3)$ (d) $[0.5, 1.5]$ (e) $[0, 4)$

19. Solve the differential equation $y' = \tan(y)$.

(a) $y = \sin^{-1}(x + C)$ (b) $y = \sin^{-1}(Ce^x)$ (c) $y = \sin(x + C)$

(d) $y = Ce^{\sin(x)}$ (e) $y = Ce^{-\sin(x)}$

20. Evaluate $\int \dfrac{x - 13}{x^2 - 2x - 15} \, dx$

(a) $\ln\left|\dfrac{(x-5)^2}{x+3}\right| + C$ (b) $\ln|(x+3)^3(x-5)| + C$ (c) $\ln|(x-5)^3(x+3)| + C$

(d) $\dfrac{1}{2}\ln|x^2 - 2x - 15| + C$ (e) $\ln\left|\dfrac{(x+3)^2}{x-5}\right| + C$