Answer Key 1

MATH 10560: Calculus II **Practice Final 1** *December 17, 2008*

Record your answers to the multiple choice problems by placing an $\times$ through one letter for each problem on this page. There are 22 multiple choice questions worth 6 points each. You start with 18 points.

You may not use a calculator.

1.	•	b	c	d	e	12.	a	•	c	d	e
2.	a	b	c	•	e	13.	a	b	c	d	•
3.	a	•	c	d	e	14.	a	b	c	d	•
4.	a	b	c	•	e	15.	a	b	c	d	•
5.	a	b	•	d	e	16.	a	b	•	d	e
6.	a	b	•	d	e	17.	a	•	c	d	e
7.	a	•	c	d	e	18.	a	•	c	d	e
8.	•	b	c	d	e	19.	a	b	c	•	e
9.	a	b	•	d	e	20.	a	b	•	d	e
10.	a	•	c	d	e	21.	a	b	c	•	e
11.	•	b	c	d	e	22.	a	b	c	•	e

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1. a b c d e	12. a b c d e
2. a b c d e	13. a b c d e
3. a b c d e	14. a b c d e
4. a b c d e	15. a b c d e
5. a b c d e	16. a b c d e
6. a b c d e	17. a b c d e
7. a b c d e	18. a b c d e
8. a b c d e	19. a b c d e
9. a b c d e	20. a b c d e
10. a b c d e	21. a b c d e
11. a b c d e	22. a b c d e

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

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

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

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

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

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

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

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

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

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

(c) $-\frac{\pi}{2}\left(x - \frac{\pi}{2}\right) - \left(x - \frac{\pi}{2}\right)^2$ (d) $x - \frac{1}{2}x^3$

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

6. Find the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!} 2^n$

(a) $\frac{e}{e^2-1}$ (b) $\frac{1}{(e-1)^2}$ (c) $\frac{1}{e^2} - 1$ (d) $\frac{2}{e}$ (e) $\frac{2}{e^2+1}$

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

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

(d) $(10^{10}-1)\ln(10)$ (e) $(10^{11}-1)/11$

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

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

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

9. Determine which expression gives the length of the curve $x = t - \ln(t)$, $y = t + \ln(t)$, $1 \le t \le 2$.

(a) $\int_1^2 \sqrt{2t^2 + 2\ln(t)^2} \, dt$ (b) $\int_1^2 \sqrt{2 + \frac{4}{t} + \frac{2}{t^2}} \, dt$ (c) $\int_1^2 \sqrt{2 + \frac{2}{t^2}} \, dt$

(d) $\int_1^2 \sqrt{1 + \left(1 - \frac{1}{t}\right)^2} \, dt$ (e) $\int_1^2 \sqrt{1 + \left(1 + \frac{1}{t}\right)^2} \, dt$

10. 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) 2500 (b) 2250 (c) 2000 (d) 1750 (e) 2750

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

(a) *converges absolutely*

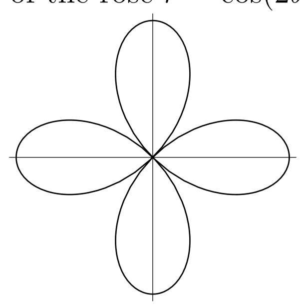
(b) *diverges by the Integral Test*

(c) *diverges by the Divergence Test*

(d) *converges by the Ratio Test*

(e) *converges conditionally*

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

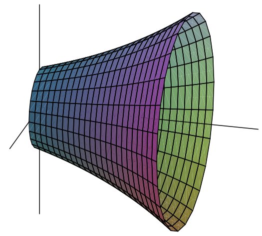


(a) $\pi/6$ (b) $\pi/8$ (c) π (d) $\pi/2$ (e) $\pi/4$

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

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

14. 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) $2\pi \int_0^1 \sqrt{1+e^x}\, dx$ (b) $2\pi \int_0^1 e^x\, dx$ (c) $2\pi \int_0^1 xe^x\, dx$

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

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

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

(d) $\frac{\sqrt{x^2+4}}{4x} = C$ (e) $\frac{x}{4\sqrt{x^2+4}} + C$

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

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

(a) $y = -\frac{1}{4}x + \frac{1}{2}$ (b) $y = -\frac{3}{16}x + \frac{1}{2}$ (c) $y = -x + \frac{1}{4}$

(d) $y = \frac{5}{8}x + \frac{1}{8}$ (e) $y = \frac{3}{2}x + \frac{1}{8}$

18. Evaluate $\int \frac{x-13}{x^2-2x-15}\,dx$

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

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

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

(a) 1 (b) ∞ (c) $1/e$ (d) e (e) $e-1$

20. Find the points on the parametric curve $x=t^2-1$, $y=t^3-12t$ where the tangent os vertical.

(a) $(0,\pm 1)$ (b) $(-1,0)$ (c) $(3,\pm 16)$ (d) $(8,\pm 9)$ (e) $(1,\pm 10\sqrt{2})$

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

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

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

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

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