Answer Key 1

MATH 10560: Calculus II **Practice Exam 2.2** *October 28, 2009*

Record your answers to the multiple choice problems by placing an $\times$ through one letter for each problem on this page. There are 12 multiple choice questions worth 7 points each. You start with 16 points.

You may not use a calculator.

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2. [a] [b] [c] [d] [•]
3. [a] [b] [c] [d] [•]
4. [a] [b] [•] [d] [e]
5. [a] [b] [c] [•] [e]
6. [a] [b] [•] [d] [e]
7. [a] [b] [c] [•] [e]
8. [a] [•] [c] [d] [e]
9. [a] [b] [c] [•] [e]
10. [•] [b] [c] [d] [e]
11. [•] [b] [c] [d] [e]
12. [a] [b] [•] [d] [e]

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1. Find the orthogonal trajectories of the family of hyperbolas defined by $x^2 - 4y^2 = a^2$.

   (a) $y^2 + 4x^2 = c^2$. (b) $y = cx^{-2}$ (c) $y = cx^{-4}$

   (d) $y^2 - 4x^2 = c^2$. (e) $x = cy^4$

2. Find an approximation to $\int_1^3 \frac{1}{x}\,dx$ using Simpson's rule with 4 subdivisions.

   (a) 82/15 (b) 62/45 (c) 41/45 (d) 16/15 (e) 11/10

3. Determine which of the following expressions gives the general form of the partial fraction decomposition of $\frac{x}{(x^4-1)^2}$.

   (a) $\frac{A}{x^2-1} + \frac{B}{x^2+1} + \frac{Cx+D}{(x^2-1)^2} + \frac{Ex+F}{(x^2+1)^2}$

   (b) $\frac{A}{(x-1)^2} + \frac{B}{(x+1)^2} + \frac{Cx^2+D}{(x^2+1)^2}$

   (c) $\frac{A}{x-1} + \frac{B}{x+1} + \frac{Cx+D}{(x-1)^2} + \frac{Ex+F}{(x+1)^2} + \frac{Gx+H}{x^2+1} + \frac{Ix^2+J}{(x^2+1)^2}$

   (d) $\frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+1} + \frac{D}{(x+1)^2} + \frac{Ex+F}{(x^2+1)^2}$

   (e) $\frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+1} + \frac{D}{(x+1)^2} + \frac{Ex+F}{x^2+1} + \frac{Gx+H}{(x^2+1)^2}$

4. Determine the area of the surface obtained by rotating the curve $y = 1 - \dfrac{x^2}{2}$, $0 \le x \le \sqrt{2}$, about the y-axis.

(a) $3\pi/2$ (b) $6\pi(\sqrt{2} - 1/2)$ (c) $2\pi(\sqrt{3} - 1/3)$

(d) $\pi(2\sqrt{3} - 1)$ (e) $\pi(2\sqrt{2} - 1)$

5. Evaluate $\displaystyle\int \frac{x}{x^2 + 4x + 5}\, dx$.

(a) $\dfrac{1}{2}\ln(x^2 + 4x + 5) + C$ (b) $\dfrac{1}{2(x^2 + 4x + 5)^2} - \dfrac{1}{2}\tan^{-1}\left(\dfrac{x+2}{2}\right) + C$

(c) $\dfrac{5 - x^2}{(x^2 + 4x + 5)^2} + C$ (d) $\dfrac{1}{2}\ln(x^2 + 4x + 5) - 2\tan^{-1}(x + 2) + C$

(e) $\dfrac{1}{\sqrt{5}}\tan^{-1}\left(\dfrac{x+2}{\sqrt{5}}\right) + C$

6. Use partial fractions to evaluate $\displaystyle\int \frac{12}{x^3 + 2x^2 - 3x}\, dx$.

(a) $\ln\left|\dfrac{(x+1)(x-3)^3}{x^4}\right| + C$ (b) $\ln\left|\dfrac{(x-1)^4(x+3)}{x^3}\right| + C$

(c) $\ln\left|\dfrac{(x-1)^3(x+3)}{x^4}\right| + C$ (d) $4\ln|x^3 + 2x^2 - 3x| + C$

(e) $-12\dfrac{3x^2 + 4x^2 - 3x}{(x^3 + 2x^2 - 3x)^2} + C$

7. Evaluate $\displaystyle\int \frac{d\theta}{1-\sin(\theta)}$.

(a) $\cos(\theta)\ln(1+\sin(\theta)) - \tan(\theta) + C$

(b) $\cot(\theta) - \csc(\theta) + C$

(c) $\ln(1-\cos(\theta)) + \sec(\theta) + C$

(d) $\tan(\theta) + \sec(\theta) + C$

(e) $\ln(\theta + \cos(\theta)) + C$

8. Evaluate $\displaystyle\int_1^\infty x^2 e^{-x^3}\,dx$.

(a) $\dfrac{1}{2e}$ (b) $\dfrac{1}{3e}$ (c) $\dfrac{1}{3}$ (d) $\dfrac{1}{2}$ (e) $\dfrac{1}{e}$

9. Determine which function satisfies the differential equation $y'' + 9y = e^x$.

(a) $y = e^x$ (b) $y = \sin(3x)$ (c) $y = \cos(3x)$

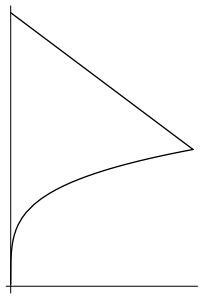
(d) $y = \dfrac{1}{10}e^x + \sin(3x)$ (e) $y = 10e^x + \cos(3x)$

10. Determine whether the integral $\displaystyle\int_0^\infty \frac{dx}{2^x\sqrt{x}}$ converges.

(a) *converges* (b) *diverges* (c) *insufficient information*

(d) *indeterminate* (e) *undefined*

11. Find the y-coordinate of the centroid of the region between the curves $y = 2 - x$ and $y = x^{1/4}$ for $0 \leq x \leq 1$. The area of this region is $7/10$.



(a) 25/21 (b) 7/6 (c) 15/14 (d) 5/6 (e) 8/7

12. Determine which of the following integrals gives the length of the curve $y = \cos(x)$, $0 \leq x \leq \pi/2$.

(a) $\displaystyle\int_0^{\pi/2} \sqrt{\cos^2(x) - \sin^2(x)}\, dx$

(b) $\displaystyle\int_0^{\pi/2} \sqrt{\sin(x)}\, dx$

(c) $\displaystyle\int_0^{\pi/2} \sqrt{1 + \sin^2(x)}\, dx$

(d) $\displaystyle\int_0^{\pi/2} \sqrt{\cos(x)}\, dx$

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