Answer Key 1

MATH 10560: Calculus II **Practice Exam 2.1** *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] [•] [d] [e]
3. [a] [b] [•] [d] [e]
4. [a] [•] [c] [d] [e]
5. [a] [•] [c] [d] [e]
6. [a] [b] [c] [d] [•]
7. [•] [b] [c] [d] [e]
8. [a] [b] [c] [d] [•]
9. [a] [b] [•] [d] [e]
10. [a] [b] [c] [•] [e]
11. [a] [b] [c] [d] [•]
12. [a] [b] [c] [d] [•]

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1. Find the limit of the sequence $\dfrac{2^n + (-1)^n}{2^{2n}}$.

(a) *diverges* (b) 1/2 (c) 1 (d) 0 (e) 1/4

2. Evaluate $\displaystyle\int_0^1 \frac{dx}{(x+1)\sqrt{x}}$.

(a) 1/4 (b) 1/2 (c) $\pi/2$ (d) $\pi/8$ (e) 1

3. Determine which integral gives the length of the curve $x = y + e^y$, $0 \le y \le 1$.

(a) $\displaystyle\int_0^1 \sqrt{1 + \frac{1}{(t+1)^2}}\, dt$ (b) $\displaystyle\int_0^1 \sqrt{1 + e^{2t}}\, dt$ (c) $\displaystyle\int_0^1 \sqrt{2 + 2e^t + e^{2t}}\, dt$

(d) $\displaystyle\int_0^1 1 + e^t\, dt$ (e) $\displaystyle\int_0^1 \sqrt{2 + \frac{1}{(t+2)^2}}\, dt$

4. Find the area of the surface obtained by rotating the curve $y = \dfrac{1}{3}x^3$, $0 \le x \le 1$, about the x-axis.

(a) $\dfrac{\pi}{4}\sqrt{2}$ (b) $\dfrac{\pi}{9}(2\sqrt{2} - 1)$ (c) $\dfrac{2\pi}{3}\sqrt{2}$

(d) $\dfrac{2\pi}{3}(\sqrt{2} - 1)$ (e) $\dfrac{\pi}{12}(3\sqrt{2} - 2)$

5. Determine the values of r for which the function $y = e^{rx}$ satisfies the differential equation $2y'' - y' - 3y = 0$.

(a) 1, $-2/3$ (b) 3/2, -1 (c) 3, -2 (d) 3, -1 (e) 1/2, -3

6. A room contains 800 cubic feet of air, and 15% (= 120 cubic feet) of that air is oxygen. Fresh air with 20% oxygen is pumped into the room at a rate of 2 cubic feet per second and the well-circulated air flows out at the same rate. Find the amount of oxygen (in cubic feet) in the room after t seconds.

(a) $160 - 120e^{-t/200}$ (b) $80 + 40e^{-t/200}$ (c) $120 - 80e^{-t/800}$

(d) $100 + 20e^{-t/400}$ (e) $160 - 40e^{-t/400}$

7. Determine the values of p for which $\displaystyle\int_0^1 \frac{dx}{(1-x)^p}$ converges.

(a) $p < 1$ (b) $p \geq 0$ (c) $p \leq 0$ (d) $0 \leq p < 1$ (e) $p > 1$

8. Use partial fractions to evaluate $\displaystyle\int_0^1 \frac{dx}{x^2 + 9x + 20}$.

(a) $\ln(2/3)$ (b) $\ln(3/2)$ (c) $\ln(5/6)$ (d) $\ln(5/4)$ (e) $\ln(25/24)$

9. Give the error bound for the Midpoint Rule approximation of $\displaystyle\int_a^b f(x)\,dx$ using n subintervals.

(a) $\dfrac{K(b-a)^3}{12n^3}$ (b) $\dfrac{K(b-a)^4}{16n^2}$ (c) $\dfrac{K(b-a)^3}{24n^2}$ (d) $\dfrac{K(b-a)^4}{18n^3}$ (e) $\dfrac{K(b-a)^5}{180n^4}$

10. Determine which expression gives the general form of the partial fraction decomposition of $\dfrac{3x+1}{x^5+2x^3+x}$.

(a) $\dfrac{A}{x+1}+\dfrac{B}{(x+1)^2}+\dfrac{E}{x}$

(b) $\dfrac{A}{x+2}+\dfrac{Bx+C}{(x+1)^2}+\dfrac{E}{x}$

(c) $\dfrac{A}{x+2}+\dfrac{B}{x+1}+\dfrac{E}{x}$

(d) $\dfrac{Ax+B}{x^2+1}+\dfrac{Cx+D}{(x^2+1)^2}+\dfrac{E}{x}$

(e) $\dfrac{Ax+B}{(x^2+1)^2}+\dfrac{E}{x}$

11. Evaluate $\displaystyle\int_1^\infty \frac{dx}{(4x+3)^2}$.

(a) 1/14 (b) 1/4 (c) ∞ (d) 1/42 (e) 1/28

12. Find the centroid of the triangle with vertices $(0,0)$, $(1,0)$, $(1,1)$.

(a) $\left(\frac{4}{5},\frac{3}{5}\right)$ (b) $\left(\frac{1}{2},\frac{1}{2}\right)$ (c) $\left(\frac{3}{4},\frac{1}{2}\right)$ (d) $\left(\frac{5}{6},\frac{2}{3}\right)$ (e) $\left(\frac{2}{3},\frac{1}{3}\right)$