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MATH 172

Exam 1

Spring 2020

Sections 501

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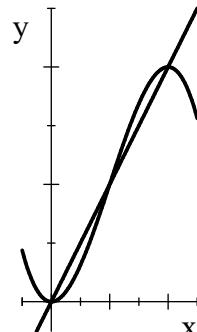
Multiple Choice: (4 points each. No part credit.)

1. Compute $\int_0^{\pi/2} \cos^{3/2} x \sin x dx.$

- a. $\frac{1}{5}$
- b. $\frac{2}{5}$
- c. $\frac{4}{5}$
- d. $\frac{5}{2}$
- e. 5

2. Find the total area between $y = 3x^2 - x^3$ and $y = 2x$.

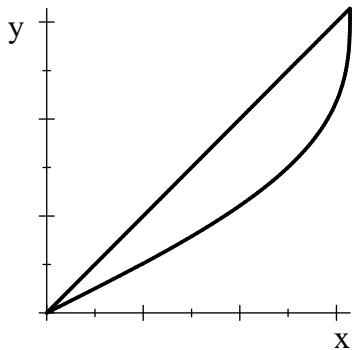
- a. 0
- b. $\frac{1}{4}$
- c. $\frac{1}{2}$
- d. 1
- e. 2



1-14	/56	16	/18
15	/17	17	/15
		Total	/106

3. Find the area between $x = y + \sin y$ and $x = y$.

- a. π
- b. $\frac{\pi}{2}$
- c. 4
- d. 3
- e. 2



4. Find the area between $y = 3x\sqrt{16+x^2}$ and the x -axis for $0 \leq x \leq 3$

- a. 61
- b. 9
- c. $3^{3/2}$
- d. 54
- e. 244

5. Compute $\int_0^1 2xe^{2x} dx$.

- a. $\frac{1}{2}(e^2 - 1)$
- b. $\frac{1}{2}(e^2 + 1)$
- c. $\frac{1}{2}e^2$
- d. $\frac{1}{2}(3e^2 - 1)$
- e. $\frac{3}{2}e^2$

6. Find the average value of the function $f(x) = \sin x$ on the interval $[0, \pi]$.

- a. $\frac{2}{\pi}$
- b. $\frac{1}{\pi}$
- c. 2π
- d. π
- e. 2

7. Find the length of the parametric curve $x = \theta$ and $y = \ln(\cos \theta)$ for $0 \leq \theta \leq \frac{\pi}{4}$.

- a. $\ln|\sqrt{2} + 1| + 1$
- b. $\ln|\sqrt{2} - 1| + 1$
- c. $\ln|\sqrt{2} + 1| - 1$
- d. $\ln|\sqrt{2} - 1|$
- e. $\ln|\sqrt{2} + 1|$

8. The curve $(x, y) = \left(t + 1, \frac{t^2}{2} + t\right)$ for $0 \leq t \leq 1$ is rotated about the y -axis.

Find the surface area.

- a. $\frac{2\pi}{3}$
- b. $\frac{8\pi}{3}5^{3/2}$
- c. $\frac{2\pi}{3}(5^{3/2} - 2^{3/2})$
- d. $\frac{8\pi}{3}(5^{3/2} - 1)$
- e. $\frac{8\pi}{3}(5^{3/2} - 2^{3/2})$

9. Compute $\int_1^2 x^3 \ln x dx$.

- a. $2 \ln 2 - \frac{7}{8}$
- b. $2 \ln 2 - \frac{9}{8}$
- c. $2 \ln 2 - \frac{15}{16}$
- d. $4 \ln 2 - \frac{15}{16}$
- e. $4 \ln 2 - \frac{17}{16}$

10. Compute $\int_{\pi/4}^{\pi/3} \tan^3 \theta \sec^2 \theta d\theta$.

- a. 2
- b. 4
- c. 20
- d. $\frac{1}{4}$
- e. $\frac{1}{2}$

11. Compute $\int_0^\pi \cos^4 \theta d\theta$.

- a. $\frac{3\pi}{16}$
- b. $\frac{5\pi}{16}$
- c. $\frac{5\pi}{8}$
- d. $\frac{3\pi}{8}$
- e. $\frac{3\pi}{4}$

12. Compute $\int \frac{1}{(4-x^2)^{3/2}} dx$

a. $\frac{1}{4\sqrt{4-x^2}} + C$

b. $\frac{x}{4\sqrt{4-x^2}} + C$

c. $\frac{1}{2\sqrt{4-x^2}} + C$

d. $\frac{\sqrt{4-x^2}}{4x} + C$

e. $\frac{\sqrt{4-x^2}}{2x} + C$

13. Compute $\int 9x^2 \cos(3x) dx$.

a. $3x^2 \sin(3x) + 2x \cos(3x) + \frac{2}{3} \sin(3x) + C$

b. $3x^2 \sin(3x) - 2x \cos(3x) - \frac{2}{3} \sin(3x) + C$

c. $3x^2 \sin(3x) + 2x \cos(3x) - \frac{2}{3} \sin(3x) + C$

d. $3x^2 \sin(3x) - 2x \cos(3x) + \frac{2}{3} \sin(3x) + C$

14. A rocket takes off from rest ($v = 0$) at the ground ($y = 0$) and has acceleration $a = 40e^{-2t}$.
Find its height at $t = 2$.

 - a. $10e^{-4}$
 - b. $40e^{-4}$
 - c. $160e^{-4}$
 - d. $10e^{-4} + 30$
 - e. $10e^{-4} + 10$

Work Out: (Points indicated. Part credit possible. Show all work.)

15. (17 points) A bar between $x = 1$ and $x = 9$ has linear density $\delta = \frac{1}{\sqrt{x}}$ g/cm.

 - Find the total mass of the bar.
 - Find the center of mass of the bar.

16. (18 points) Compute $\int e^{4x} \cos 3x dx$.

17. (15 points) Compute $\int \frac{1}{x^2 \sqrt{x^2 - 4}} dx$.