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MATH 172 Honors

Exam 1

Spring 2019

Sections 200

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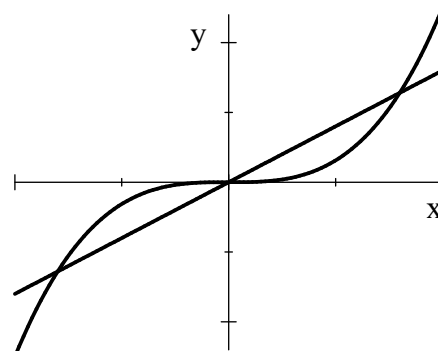
Multiple Choice: (5 points each. No part credit.)

1. Find the area between $y = x^2 - 8$ and $y = 2x$.

- a. 24
- b. $\frac{80}{3}$
- c. 36
- d. $\frac{124}{3}$
- e. 48

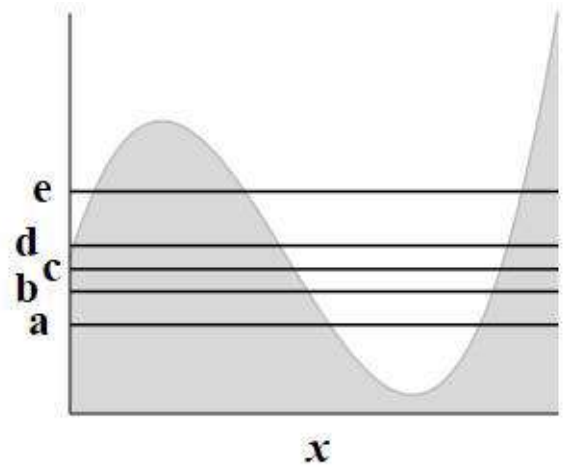
2. Find the area between $y = x^3$ and $y = 16x$.

- a. 32
- b. 36
- c. 48
- d. 64
- e. 128



1-13	/65	15	/10
14	/20	16	/15
		Total	/110

3. Which value is the average of the function?



4. Compute $\int_0^{\sqrt{\pi}} x \sin(x^2) dx$.

- a. 1
- b. 2
- c. 3
- d. 4
- e. 6

5. Compute $\int (x^2 + 1)e^{2x} dx$.

- a. $\frac{1}{2}(x^2 + 1)e^{2x} - \frac{1}{4}xe^{2x} + \frac{1}{4}e^{2x} + C$
- b. $\frac{1}{2}(x^2 + 1)e^{2x} - \frac{1}{2}xe^{2x} - \frac{1}{2}e^{2x} + C$
- c. $\frac{1}{2}(x^2 + 1)e^{2x} - \frac{1}{2}xe^{2x} + \frac{1}{4}e^{2x} + C$
- d. $\frac{1}{2}(x^2 + 1)e^{2x} - \frac{1}{2}xe^{2x} + \frac{1}{2}e^{2x} + C$
- e. $\frac{1}{2}(x^2 + 1)e^{2x} - \frac{1}{2}xe^{2x} - \frac{1}{4}e^{2x} + C$

6. Find the average value of the function $f(x) = 9 - x^2$ on the interval $[0, 3]$.

- a. $\frac{27}{4}$
- b. 6
- c. 5
- d. $\frac{9}{2}$
- e. 3

7. Find the length of the parametric curve $x = t^4$ and $y = \frac{1}{2}t^6$ for $0 \leq t \leq 1$.

- a. $\frac{13}{6}$
- b. $\frac{13}{3}$
- c. $\frac{13}{2}$
- d. $\frac{1}{54}$
- e. $\frac{61}{54}$

8. The curve $y = x^3$ for $0 \leq x \leq 2$ is rotated about the x -axis. Find the surface area.

- a. $\frac{\pi}{27}2^{3/2}$
- b. $\frac{\pi}{12}(2^{3/2} - 1)$
- c. $\frac{\pi}{27}(145^{3/2} - 1)$
- d. $\frac{\pi}{12}(145^{3/2} - 1)$
- e. $\frac{\pi}{12}145^{3/2}$

9. Compute $\int_0^{\pi} \sin^3 \theta \cos^2 \theta d\theta$.

- a. $\frac{2}{5}$
- b. $\frac{2}{3}$
- c. $\frac{2}{15}$
- d. $\frac{4}{15}$
- e. $\frac{8}{15}$

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

- a. $\frac{2}{5}$
- b. $\frac{2}{3}$
- c. $\frac{2}{15}$
- d. $\frac{4}{15}$
- e. $\frac{8}{15}$

11. Compute $\int_0^{\pi/4} \tan^3 \theta \sec^3 \theta d\theta$.

- a. $\frac{2}{15} (\sqrt{2} - 1)$
- b. $\frac{2}{15} (\sqrt{2} + 1)$
- c. $\frac{1}{15} (\sqrt{2} + 1)$
- d. $\frac{1}{15} (\sqrt{2} - 1)$
- e. $\frac{2}{15} (1 - \sqrt{2})$

12. Compute $\int \frac{1}{(9+x^2)^{3/2}} dx$

a. $\frac{1}{9\sqrt{9+x^2}} + C$

b. $\frac{x}{9\sqrt{9+x^2}} + C$

c. $\frac{1}{3\sqrt{9+x^2}} + C$

d. $\frac{\sqrt{9+x^2}}{9x} + C$

e. $\frac{\sqrt{9+x^2}}{3x} + C$

13. Compute $\int \frac{1}{\sqrt{x^2+4x-5}} dx$.

a. $\frac{1}{x} \ln|x + \sqrt{x^2+4x-5}| + C$

b. $\ln|x - \sqrt{x^2+4x-5}| + C$

c. $\ln|x+2 + \sqrt{x^2+4x-5}| + C$

d. $\ln|x+2 - \sqrt{x^2+4x-5}| + C$

e. $\ln\left|\frac{3}{x+2} + \frac{\sqrt{x^2+4x-5}}{3}\right| + C$

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

14. (20 points) A 10 cm bar has linear density $\delta = e^{-x}$ g/cm where x is measured from one end.

a. Find the total mass of the bar.

b. Find the center of mass of the bar.

15. (10 points) Compute $\int x \arctan x \, dx$.

HINT: To complete the last integral, add and subtract 1 in the numerator.

16. (15 points) Compute $\int e^{3x} \cos 4x dx$.