Name_____

MATH 172 Exam 1 Spring 2019

Sections 501 P. Yasskin

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 $y = 16x$.

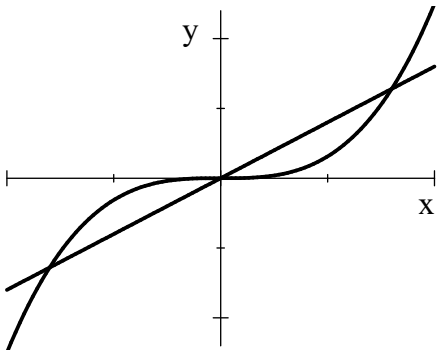
a. 32

b. 36

c. 48

d. 64

e. 128



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

3. Find the area between $x = 36 - y^2$ and the y-axis

a. 108
b. 216
c. 144
d. 288
e. 432

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 $0 \le t \le 1$.

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 $0 \le x \le 2$ 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. $\frac{2}{15}\left(\sqrt{2}-1\right)$

b. $\frac{2}{15}\left(\sqrt{2}+1\right)$

c. $\frac{1}{15}\left(\sqrt{2}+1\right)$

d. $\frac{1}{15}\left(\sqrt{2}-1\right)$

e. $\frac{2}{15}\left(1-\sqrt{2}\right)$

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 $\int \frac{1}{\sqrt{x^2-4}}\,dx$.

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

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

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

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

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

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 $\int e^{3x}\cos 4x\,dx$.