Name______________________________________

1-11	/59	13	/15
12	/15	14	/15
		Total	/104

MATH 172 Exam 2 Spring 2021

Sections 501 P. Yasskin

Multiple Choice and Short Answer: (Points indicated. No Part Credit)

1. (5 pts) How many terms are there in the general partial fraction expansion of

$$\frac{6+7x}{(x-2)^2(x^2-4)(x^2+4)}?$$

Note: $\frac{A}{(x-2)^2}$ and $\frac{Bx+C}{x^2+4}$ each count as 1 term.

The number of terms is

Answer: $n =$ ______

2. (5 pts) Find the coeficients in the partial fraction decomposition

$$\frac{x-1}{x^2-5x+6} = \frac{A}{x-3} + \frac{B}{x-2}$$

Then compute $A-2B$.

Answer: $A-2B =$ ______

3. (5 pts) Given that $\frac{32}{x^4-16} = \frac{1}{x-2} - \frac{1}{x+2} - \frac{4}{x^2+4}$ compute $\int_0^1 \frac{32}{x^4-16}\,dx$.

a. $-\ln 3 - \arctan\frac{1}{2}$

b. $-\ln 3 - 2\arctan\frac{1}{2}$

c. $\ln 2 - \ln 3 - \arctan\frac{1}{2}$

d. $\ln 2 - \ln 3 - 2\arctan\frac{1}{2}$

e. $2\ln 2 - \ln 3 - \arctan\frac{1}{2}$

f. $2\ln 2 - \ln 3 - 2\arctan\frac{1}{2}$

4. (5 pts) The region between $x = 25 - y^2$ and the y-axis is rotated about the y-axis. Find the volume.

a. $\frac{2^4 5^4}{3}\pi$

b. $\frac{2^4 5^3}{3}\pi$

c. $\frac{2^3 5^4}{3}\pi$

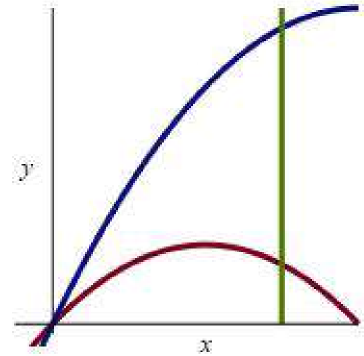
d. $2^3 5^5 3\pi$

e. $2^2 5^4 3\pi$

5. (5 pts) The base of a solid is the region bounded by

$y = 4x - x^2$ and $y = 8x - x^2$ and $x = 3$.

The slices perpendicular to the x-axis are semicircles with a diameter on the base. Find the volume.



a. 9π	g. 72π
b. 12π	h. 96π
c. 18π	i. 150π
d. 24π	j. 210π
e. 36π	k. 270π
f. 48π	l. 360π

6. (5 pts) The region bounded by $y = 4x - x^2$ and $y = 8x - x^2$ and $x = 3$ (See figure above.) is rotated about the x-axis. Find the volume.

a. 9π	g. 72π
b. 12π	h. 96π
c. 18π	i. 150π
d. 24π	j. 210π
e. 36π	k. 270π
f. 48π	l. 360π

7. (5 pts) The region bounded by $y = 4x - x^2$ and $y = 8x - x^2$ and $x = 3$ (See figure above.) is rotated about the y-axis. Find the volume.

a. 9π	g. 72π
b. 12π	h. 96π
c. 18π	i. 150π
d. 24π	j. 210π
e. 36π	k. 270π
f. 48π	l. 360π

8. (5 pts) Compute the improper integral $\int_1^\infty xe^{-x}\,dx$.

a. 0

b. $\frac{1}{e}$

c. $\frac{2}{e}$

d. $\frac{4}{e}$

e. ∞

9. (5 pts) Compute the improper integral $\int_0^1 \frac{2}{\sqrt{1-x^2}}\,dx$.

a. π

b. $\frac{\pi}{2}$

c. $\frac{\pi}{3}$

d. $\frac{\pi}{4}$

e. divergent

10. (5 pts) Compute the improper integral $\int_0^{16} \frac{1}{(x-8)^{4/3}}\,dx$.

a. 0

b. $-\frac{3}{4}$

c. $-\frac{3}{2}$

d. -3

e. divergent

11. (9 pts) The rest position of a certain spring is at $x = 0$ cm.
It takes 72 ergs of work to stretch it from $x = 4$ cm to $x = 8$ cm.

a. Find the spring constant.

$k =$ _____ $\frac{\text{dynes}}{\text{cm}}$

b. How much work does it take to stretch it from $x = 2$ cm to $x = 6$ cm?

$W =$ _____ ergs

c. How much forch is needed to hold it at $x = 5$ cm?

$F =$ _____ dynes

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

12. (15 pts) Find the partial fraction expansion for $\frac{2x+9}{x^3+9x} = \frac{A}{x} + \frac{Bx+C}{x^2+9}$.

$A =$ _____ $B =$ _____ $C =$ _____

13. (15 pts) Determine if the improper integral $\int_2^\infty \frac{2}{e^x+x}\,dx$ converges or diverges.

Do the integral exactly or use a Comparison Test.

If you do the integral exactly, be sure to state all substitutions you make and their differentials.

If you use a comparison, be sure to state the comparison integral, explain why the comparison integral converges or diverges and check the inequality.

(You will be graded for good sentences!)

_____Convergent _____Divergent

14. (15 pts) A cone is 12 cm tall and 6 cm in radius at the top.

It is filled with salt water of density $\delta = 1.02 \frac{\text{gm}}{\text{cm}^3}$ to a depth of 8 cm.

Find the work done to pump all the water over the top of the cone.

For numerical computations, use the approximation that

$\delta g = 9.8 \cdot 1.02 \approx 10 \frac{\text{gm} \cdot \text{cm}}{\text{sec}^2}$.

$W =$ _____