Name_____

MATH 172 Exam 2 Spring 2019

Sections 501 P. Yasskin

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

1. Consider the integrals:

$$A = \int_3^4 \frac{1}{(x-3)^{2/3}}\,dx \qquad B = \int_3^4 \frac{1}{(x-3)^{4/3}}\,dx \qquad C = \int_4^\infty \frac{1}{(x-3)^{2/3}}\,dx \qquad D = \int_4^\infty \frac{1}{(x-3)^{4/3}}\,dx$$

Which are finite? Which are infinite?

a. A and B are finite. C and D are infinite.
b. B and C are finite. A and D are infinite.
c. B and D are finite. A and C are infinite.
d. A and D are finite. B and C are infinite.
e. A and C are finite. B and D are infinite.

2. Compute $\int_0^1 \frac{1}{\sqrt{1-x^2}}\,dx$.

a. π
b. $\frac{\pi}{2}$
c. $\frac{\pi}{4}$
d. 0
e. divergent

1-11	/55	14	/12
12	/15	15	/12
13	/10	Total	/104

3. Which of the following terms does NOT belong in the general partial fraction expansion of

$$\frac{x^3 - 6x^2 + 7}{(x-4)(x-3)^2(x^2+4)(x^2+9)^3}$$

a. $\frac{A}{(x-4)}$

b. $\frac{B}{(x-3)^2}$

c. $\frac{Cx+D}{(x^2+9)}$

d. $\frac{Ex+F}{(x^2+9)^3}$

e. They all belong.

4. In the partial fraction expansion $\frac{x}{(x-2)(x-3)^3} = \frac{A}{x-2} + \frac{B}{x-3} + \frac{C}{(x-3)^2} + \frac{D}{(x-3)^3}$ which coefficient is INCORRECT?

a. $A = -2$

b. $B = 2$

c. $C = -3$

d. $D = 3$

e. They are all correct.

5. Find the location of the vertical tangents to the parametric curve:

$$x = t^3 - 3t \qquad y = t^2 - 4t$$

a. $(-2,-3)$ and $(2,5)$ only

b. $(-2,-3)$, $(2,-4)$ and $(2,5)$ only

c. $(-2,-3)$ and $(2,-4)$ only

d. $(2,-4)$ only

e. $(2,-4)$ and $(2,5)$ only

6. The base of a solid is the region between $y = x^2$ and the x-axis for $0 \le x \le 3$. The cross sections perpendicular to the x-axis are squares. Find the volume of the solid.

a. $\frac{3^4}{4}$

b. $\frac{3^5}{5}$

c. 9

d. 27

e. 81

7. The region between $y = x^2$ and the x-axis for $0 \le x \le 4$ is rotated about the y-axis. Find the volume swept out.

a. 8π

b. 16π

c. 32π

d. 64π

e. 128π

8. The region between $y = x^2$ and the x-axis for $0 \le x \le 4$ is rotated about the x-axis. Find the volume swept out.

a. $\frac{1024\pi}{5}$

b. 64π

c. $\frac{64\pi}{3}$

d. 32π

e. $\frac{32\pi}{3}$

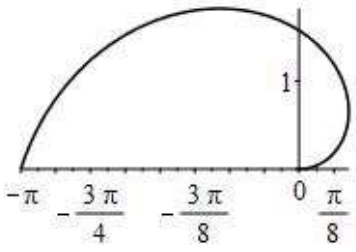
9. It takes a 40 N force to stretch a certain spring to 8 m from its rest position.
How much work does it take to stretch this spring from 1 m from rest to 9 m from rest.

a. 25 J
b. 50 J
c. 100 J
d. 200 J
e. 400 J

10. A 100 foot rope weighs $\delta = 2 \frac{\text{lb}}{\text{foot}}$. It is hanging from the top of a 100 foot tall building.
How much work is done to pull it up to the top of the building.

a. 5000
b. 10000
c. 20000
d. $\frac{100^3}{3}$
e. $2\frac{100^3}{3}$

11. Find the area inside the spiral $r = \theta$ for $0 \le \theta \le \pi$.



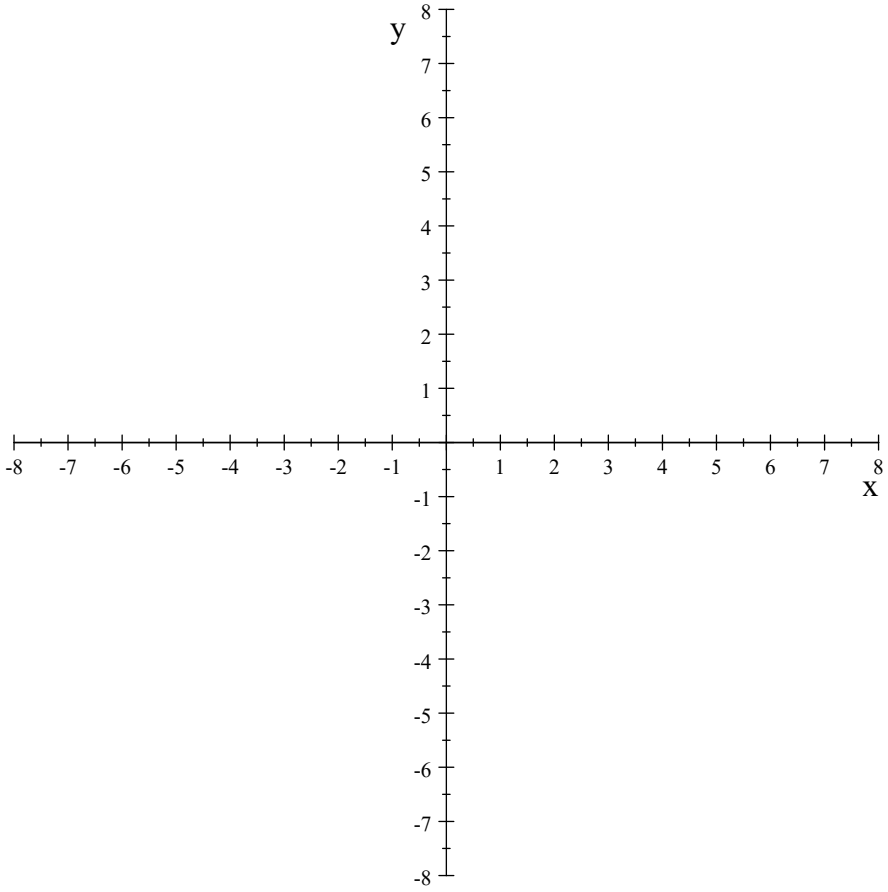
a. $\frac{\pi^3}{2}$
b. $\frac{\pi^3}{3}$
c. $\frac{\pi^3}{6}$
d. $\frac{\pi^2}{2}$
e. $\frac{\pi^2}{4}$

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

12. $(15$ points$)$ A water trough is 18 meters long. Its end is an isoceles triangle with vertex down whose width is 8 meters and height is 12 meters. The trough is filled with water to a depth of 6 meters. How much work is done to pump the water out the top of the tank? Answers can be given as a multiple of δg where δ is the densty of water g is the acceleration of gravity is g.

13. $(10$ points$)$ Find the length of the spiral $r = \theta^2$ for $0 \le \theta \le \pi$.

14. $(12$ points$)$ Plot the graph of the limaçon $r = 2 + 4\sin\theta$.



15. (12 points) Given the partial fraction expansion $\dfrac{10x^2-60}{(x-4)^2(x^2+4)} = \dfrac{2}{x-4} + \dfrac{5}{(x-4)^2} + \dfrac{-2x-3}{x^2+4}$

Compute $\displaystyle\int \frac{10x^2-60}{(x-4)^2(x^2+4)}\,dx.$