Center for Academic Resources in Engineering (CARE)
Peer Exam Review Session

Math 231 – Calculus II

Midterm 3 Worksheet

The problems in this review are designed to help prepare you for your upcoming exam. Questions pertain to material covered in the course and are intended to reflect the topics likely to appear in the exam. Keep in mind that this worksheet was created by CARE tutors, and while it is thorough, it is not comprehensive. In addition to exam review sessions, CARE also hosts regularly scheduled tutoring hours.

Tutors are available to answer questions, review problems, and help you feel prepared for your exam during these times:

Session 1: December 2nd, 7-9pm Maya and Yash

Can't make it to a session? Here's our schedule by course:

https://care.grainger.illinois.edu/tutoring/schedule-by-subject

Solutions will be available on our website after the last review session that we host.

Step-by-step login for exam review session:

1. Log into Queue @ Illinois: https://queue.illinois.edu/q/queue/844
2. Click "New Question"
3. Add your NetID and Name
4. Press "Add to Queue"

Please be sure to follow the above steps to add yourself to the Queue.

Good luck with your exam!

1. You are given the power series

$$\sum_{n=1}^{\infty} \frac{(x-7)^n}{3^n(2n+1)}$$

.

(a) Find the radius of convergence.

(b) Find the interval of convergence.

2. Find the Maclaurin Series for:

(a)

$$f(x) = \frac{x}{1+4x^2}$$

(b)

$$f(x) = x^3 \cos\left(x^2\right)$$

3. Find the first two non-zero terms of the Maclaurin Series for

(a) This function $f(x)$

$$f(x) = \frac{\sin(x^2)}{x}$$

(b) This function $g(x)$

$$g(x) = x \cos\left(x^2\right)$$

(c) Use parts (a) and (b) to write down the first two non-zero terms in the Maclaurin Series for the product $f(x)g(x)$.

(d) Use your work in parts (a) and (b) to evaluate:

$$\lim_{n \to 0} \frac{f(x) - g(x)}{x^5}$$

4. The Maclaurin Series for $f(x)$ is shown below. Find $f^{(10)}(0)$

$$\sum_{n=1}^{\infty} \frac{(x)^{2n}}{4n^2 9^n}$$

5. Find the correct formula for the Taylor Series of $f'(x)$, the derivative of $f(x)$, centered at a.

6. Find the area outside of the region r $= 3 + 2sin(\theta)$ and inside r $= 2$.

7. Match the parametric equations with the graphs

(i) $x = t^4 - t + 1$
$y = t^2$

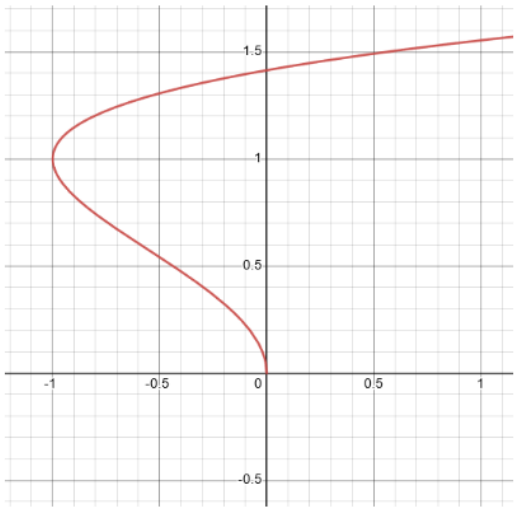
(ii) $x = t^2 - 2t$
$y = \sqrt{t}$

(iii) $x = sin(2t)$
$y = sin(t + sin(2t))$

(iv) $x = cos(5t)$
$y = sin(2t)$

(v) $x = t + sin(4t)$
$y = t^2 + cos(3t)$

(vi) $x = \frac{sin(2t)}{4+t^2}$
$y = \frac{cos(2t)}{4+t^2}$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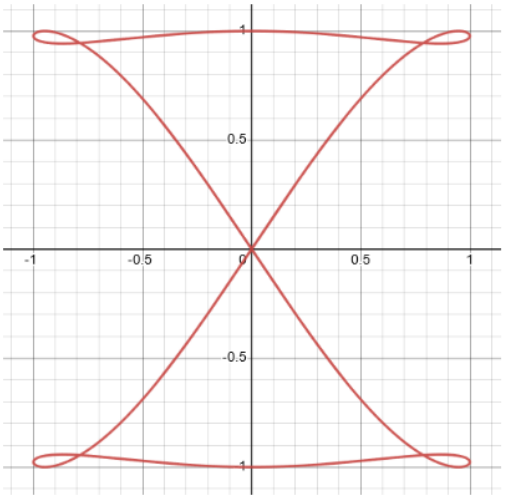
(a)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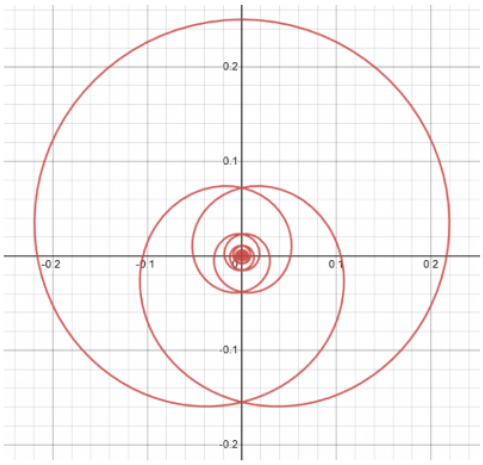
(b)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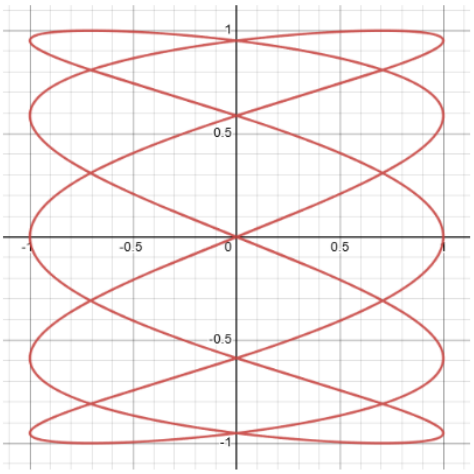
(c)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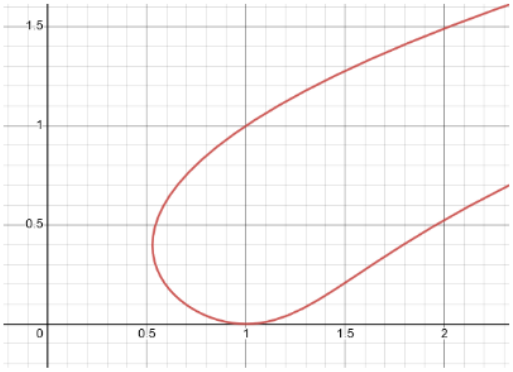
(d)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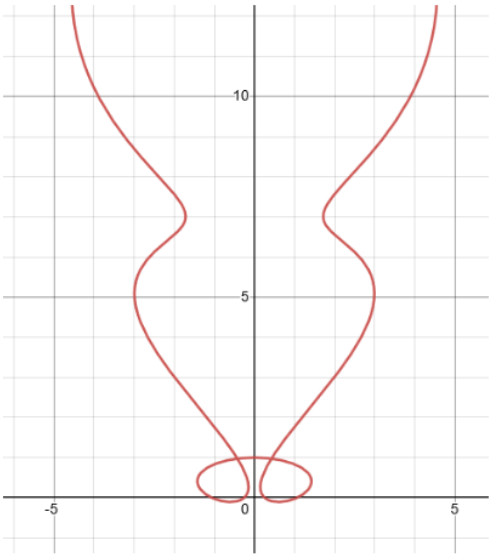
2

(e)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(f)