Review of Sections 9. 1 – 9.6
Sequences and Series

Name: _____
Date: _____

Determine if the following sequences converge or diverge. If it converges, find its limit.

1. $a_n = \frac{n^2-3}{2+2n^2}$	2. $a_n = \frac{\sin(n)}{\ln(n+1)}$	3. $a_n = \frac{2^n}{3^{n-2}}$
4. $a_n = \sin\left[\left(\frac{n}{2}\right)\pi\right]$	5. Omit	6. $a_n = n^{1/n}$

Find the sum of the following geometric series

7. $\sum_{k=0}^{\infty} \left(\frac{1}{2}\right)^k$

8. $1 - (4/9) + (16/81) - (64/729)$

9. $\pi + e + (e^2/\pi) + (e^3/\pi^2)$

Determine if the following converge or diverge

10. $\sum_{n=1}^{\infty} \frac{1}{n+3^n}$

11. $\sum_{n=1}^{\infty} \frac{(-2)^{2n}}{n^n}$

12. $\sum_{n=1}^{\infty} \frac{\sqrt{n^2-1}}{n^3+2n^2+5}$

13. $\sum_{n=1}^{\infty} (-1)^n \frac{n}{n+2}$

14. $\sum_{n=1}^{\infty} \tan(1/n)$

15. $\sum_{n=1}^{\infty} \frac{n^2 2^{n-1}}{(-5)^n}$

16. $\sum_{k=3}^{\infty} [(\ln k)/k]^k$

17. $\sum_{n=1}^{\infty} \frac{n^2+1}{5^n}$

18. $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$

19. $\sum_{n=1}^{\infty} \frac{(2^k)^k}{(k^2)^k}$

20. $\sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{n \ln n}$

21. $\sum_{k=1}^{\infty} k^2 e^{-k}$

22. $\sum_{n=1}^{\infty} \frac{3^n n^2}{n!}$

23. $\sum_{k=1}^{\infty} \frac{5^k}{3^k+4^k}$

24. $\sum_{n=1}^{\infty} (-1)^n 2^{1/n}$

25. $\sum 3(3/4)^n$

26. $\sum 2\sqrt[3]{n^{-5}}$

27. $\sum \frac{n}{\ln(n+1)}$

28. $\sum \frac{(n+2)!}{2^n(n!)}$

29. $\sum \frac{n}{2n+1}$

30. $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$

31. $\sum_{n=1}^{\infty} \frac{n+1}{n!}$

32. $\sum_{n=1}^{\infty} \frac{\ln n}{2^n}$

33. $\sum_{n=1}^{\infty} \frac{e^{\pi/2}}{\pi^n}$

Determine if the following diverges, converges absolutely, or converges conditionally

34. $\sum_{k=1}^{\infty} (-1)^k/\sqrt{k}$

35. $\sum_{k=3}^{\infty} (\ln k)/(-3)^k$

36. $\sum_{k=1}^{\infty} (-2)^k/k^2$

37. $\sum_{k=0}^{\infty} (-1)^k k^3/e^{k^4}$

38. $\sum_{k=1}^{\infty} (-2)^k/k!$

39. $\sum_{k=3}^{\infty} (-1)^k/(k \ln^2 k)$

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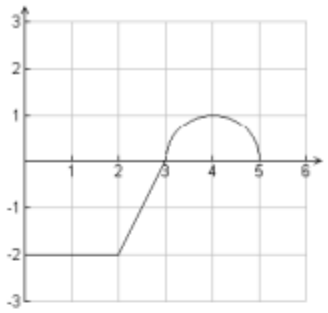

The graph of f is given. It consists of two line segments and a semi-circle.

$g(x) = \int_1^x f(t)\,dt$

(a) Find $g(0)$, $g(1)$, and $g(5)$.

(b) Find $g'(2)$, $g''(2)$, and $g'''(4)$ or state that it does not exist.

(c) For what value(s) of x does the graph of g have a point of inflection? Justify your answer.

(d) Find the absolute maximum and absolute minimum values of g on $[0, 5]$. Justify your answer.

Consider the differential equation given by $\frac{dy}{dx} = \frac{xy}{2}$.

(a) On the axes provided below, sketch a slope field for the given differential equation at the nine points indicated.

(b) Let $y = f(x)$ be the particular solution to the given differential equation with the initial condition $f(0) = 3$. Use Euler's method starting at $x = 0$, with a step size of 0.1, to approximate $f(0.2)$. Show the work that leads to your answer.

(c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$. Use your solution to find $f(0.2)$.