Midterm 2

Last Name: ______________________

First Name: ______________________

Student ID: ______________________

Signature: ______________________

Section:

Tuesday:	Thursday:	
3A	3B	TA: Andrew Sack
3C	3D	TA: Ben Jarman
3E	3F	TA: Alex Frederick

Instructions: You have 24 hours to complete this exam. You may use the lecture notes, textbook, and any other non-human resource. In particular, you may not collaborate with others or use question-answer resources like chegg or stack exchange. You must **show your work** to receive credit. Please circle or box your final answers.

Please do not write below this line.

Question	Points	Score
1	1	
2	12	
3	12	
4	12	
5	14	
Total:	51	

1. (1 point) Please read the following Honor Code and upload your signature verifying that you have read it and agree to it.

   "I certify on my honor that I have neither given nor received any help, or used any non-permitted resources, while completing this evaluation."

Name: ______________________________

2. (12 points) Calculate the following integral. Show all of your work.

$$\int_0^2 \frac{1}{(4-x^2)^{3/2}}dx$$

3. (12 points) Calculate the following integral. Show all of your work.

$$\int_{\sqrt{2}}^{e} \frac{\frac{1}{2}x^2 + 3x + 1}{x(x^2 + 2)}$$

Name: ______________________________

4. Determine if the following series converge or diverge. You may use any method (e.g. limit comparison, integral test, etc.) but you must show all your work for full credit.

   (a) (4 points)

$$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n} + \ln n}$$

   (b) (4 points)

$$\sum_{n=1}^{\infty} \frac{n}{(n^2+1)^{3/5}}$$

   (c) (4 points)

$$\sum_{k=1}^{\infty} \frac{k^{-2}}{\sec^2(k)}$$

5. Determine whether the following statements are true or false. If true, briefly say why. If false, explain why or provide a counterexample.

   No credit will be given for answers without justification.

   (a) (2 points)
$$\int_{-\infty}^{\infty} x^3 dx = 0$$

   (b) (2 points) The sequence $\{\frac{1}{n}\}$ converges.

   (c) (2 points) Let $\{a_n\}, \{b_n\}$, and $\{c_n\}$ be sequences with $a_n \leq b_n \leq c_n$ for all n. If $\{a_n\}$ and $\{c_n\}$ converge, then $\{b_n\}$ converges.

   (d) (2 points) The sequence $\left\{\frac{1}{\arctan n}\right\}_{n=1}^{\infty}$ converges.

   (e) (2 points) If the sequence $\{a_n\}$ is increasing, then the series $\sum_{n=1}^{\infty} a_n$ diverges.

   (f) (2 points) There exists a geometric series whose first term is 9 and whose sum is e

   (g) (2 points) If $\sum_{n=1}^{\infty} a_n = 0$, then $\lim_{n\to\infty} a_n = 0$