

Quiz #9

1. Determine the convergence or divergence of each of the following series. If you do not justify your answer, you will get zero credit, even if you circle the correct final answer.

In each case, demonstrate that your answer is correct in a step-by-step fashion using *an appropriate convergence test*. Be sure to explicitly state which convergence test you have used and show that it can be used with the series you are working on. Be careful to show all of your work and how the convergence test justifies your answer. As the final part of your answer in each part, CIRCLE either CONVERGES or DIVERGES.

(a) (3 points)
$$\sum_{n=1}^{\infty} \frac{3 + 2 \cdot \cos(n)}{n}$$

JUSTIFICATION:

FINAL ANSWER (CIRCLE ONE):

CONVERGES

DIVERGES

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(b) (3 points)
$$\sum_{n=2}^{\infty} \frac{n^2 \cdot e^n}{n!}$$

JUSTIFICATION:

FINAL ANSWER (CIRCLE ONE):

CONVERGES

DIVERGES

2. Suppose that all you knew about the hyperbolic sine ($\sinh(x)$) and hyperbolic cosine ($\cosh(x)$) functions was that they had the following properties:

- $\sinh(0) = 0$
- $\cosh(0) = 1$
- $\frac{d}{dx}(\sinh(x)) = \cosh(x)$
- $\frac{d}{dx}(\cosh(x)) = \sinh(x)$

- (a) **(2 points)** Use the information provided, derivatives and the definition of a Taylor polynomial above to find the degree 7 Taylor polynomial for $\sinh(x)$ based at the anchor point $a = 0$.

- (b) **(2 points)** Based on the patterns that you can see in the Taylor polynomial from Part (a), what do you think the Taylor series for $\sinh(x)$ (based at the anchor point $a = 0$) will be? Express your answer in sigma (Σ) notation.

Σ