9. [8 points] For each of the following, circle ALL that apply. There may be more than one correct answer for each part. You do not need to show any work for any part of this question.

  a. [4 points] Suppose $P(t)$ is a **cumulative distribution function** (cdf) satisfying $P(0.2) = 0.5$. Which of the following MUST be true?

$$\boxed{\lim_{t\to\infty} P(t) = 1}$$
$$\boxed{\text{The median } t\text{-value is } 0.2.}$$

$$\boxed{P(1) \geq 0.5}$$
The mean t-value is 0.2.

NONE OF THESE

  b. [4 points] The series $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{n+\sin(n)}{n^{3.1}}...$

DIVERGES   CONVERGES CONDITIONALLY

$\boxed{\text{CONVERGES}}$ $\boxed{\text{CONVERGES ABSOLUTELY}}$

NONE OF THESE

Solution: (The following justification was not required to get points on this problem.) Note that

$$\frac{n+\sin(n)}{n^{3.1}} \leq \frac{n+1}{n^{3.1}},$$

since $-1 \leq \sin(n) \leq 1$. The series $\displaystyle\sum_{n=1}^{\infty}\frac{n+1}{n^{3.1}}$ converges by limit comparison test, with

comparison series $\displaystyle\sum_{n=1}^{\infty}\frac{1}{n^{2.1}}$. This converges by the p-test with $p = 2.1$. Therefore our original series converges absolutely by the comparison test. Since it converges absolutely, it also converges.