

Topic: The student's t -distribution

Question: Compared to the standard normal distribution, the t -distribution for $n < 30$ is...

Answer choices:

- A flatter and wider
- B flatter and narrower
- C taller and wider
- D taller and narrower



Solution: A

For smaller samples ($n < 30$), the student's t -distribution is flatter and wider than the standard normal distribution (z -distribution).

As a result, the standard deviation is larger, because there's more area in the tails of the t -distribution.



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Question: What value in the t -table is associated with a sample size $n = 15$ and an upper-tail probability of 0.025?

Answer choices:

- A 2.131
- B 2.145
- C 2.602
- D 2.624



Solution: B

A sample size $n = 15$ is associated with 14 degrees of freedom.

If we locate 14 degrees of freedom down the left side of the t -table, and that row's intersection with a 0.025 upper-tail probability, the t -table returns 2.145.

	Upper-tail probability p									
df	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
13	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence level C									



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Question: Find the upper-tail probability associated with a confidence level of 99 % .

Answer choices:

- A 0.05
- B 0.025
- C 0.1
- D 0.005



Solution: D

At a 99 % confidence level,

$$\alpha = 1 - 0.99$$

$$\alpha = 0.01$$

The entire region of rejection will constitute 1 % of the area under the distribution. But this area includes both the upper and lower tails, and we want to find just upper-tail probability.

So we split the alpha value in half, and the upper-tail probability associated with a 99 % confidence level will be

$$\frac{\alpha}{2} = \frac{0.01}{2} = 0.005$$

