

## Discussion group prompt (optional)

This is an optional document you can work through with your discussion group in your discussion group meeting. Answers are on the second page, so if you don't get a chance to discuss this or you can't attend your discussion group, no worries!

### Without notes

A criminal court considers two opposing claims about a defendant: they are either innocent or guilty. In the Canadian legal system, the role of the prosecutor is to present convincing evidence that the defendant is not innocent. Lawyers for the defendant attempt to argue that the evidence is *not convincing* enough to rule out that the defendant could be innocent. If there is not enough evidence to convict the defendant and they are set free, the judge generally does not deliver a verdict of “innocent”, but rather of “not guilty”.

- (a) If we look at the criminal trial example in the hypothesis test framework, which would be the null hypothesis and which the alternative?
- (b) In the context of this problem, describe what rejecting the null hypothesis would mean.
- (c) In the context of this problem, describe what failing to reject the null hypothesis would mean.
- (d) In the context of this problem, describe what a type II error would be.
- (e) In the context of this problem, describe what a type I error would be.

## With notes

A criminal court considers two opposing claims about a defendant: they are either innocent or guilty. In the Canadian legal system, the role of the prosecutor is to present convincing evidence that the defendant is not innocent. Lawyers for the defendant attempt to argue that the evidence is *not convincing* enough to rule out that the defendant could be innocent. If there is not enough evidence to convict the defendant and they are set free, the judge generally does not deliver a verdict of “innocent”, but rather of “not guilty”.

**(a) If we look at the criminal trial example in the hypothesis test framework, which would be the null hypothesis and which the alternative?**

*The null hypothesis would be that the defendant is innocent, and the alternative hypothesis would be that the defendant is guilty. Just like in the hypothesis testing framework, we are looking for enough convincing evidence against the null hypothesis (i.e. convincing evidence against the hypothesis that the defendant is innocent).*

**(b) In the context of this problem, describe what rejecting the null hypothesis would mean.**

*Rejecting the null hypothesis would mean that there was a sufficient amount of evidence provide to make the claim that the defendant was found to be guilty.*

**(c) In the context of this problem, describe what failing to reject the null hypothesis would mean.**

*Failing to reject the null hypothesis would mean that there was not enough evidence to make the claim that the defendant was found to be guilty. This does NOT mean that the defendant is definitely innocent; there is just an insufficient amount of evidence to prove guilt (beyond a reasonable doubt).*

**(d) In the context of this problem, describe what a type II error would be.**

*If a judge/jury makes a type II error, it means that the defendant is set free even though they were in fact guilty (that is,  $H_A$  is actually true).*

**(e) In the context of this problem, describe what a type I error would be.**

*If a judge/jury makes a type I error, it means that the defendant is really innocent ( $H_0$  true) but is wrongly convicted.*