1. **True/False**: The set of rational numbers in $\mathbb{R}$ is meager.

2. **True/False**: The subset of polynomials in the metric space $C[a,b]$ is closed.

3. **True/False**: A bounded bilinear form $a(\cdot, \cdot) \geq 0$ defines a norm by $\|v\|^2 := a(v, v)$.

4. **True/False**: If $x \perp y$, then $\|x + y\|^2 = \|x\|^2 + \|y\|^2$.

5. **True/False**: A bounded linear operator $T$, which is a mapping from a Banach space $X$ into a Banach space $Y$, is an open mapping.

6. **True/False**: Define $f_z(x) = \|x - z\|$ for arguments $x$ in some normed vector space $X$. Then there is a solution to $x = \arg\max_{x \in M} f_z(x)$ for any compact subset $M \subseteq X$.

7. **True/False**: Let $X$ be a normed space. $f(x_0) = 0$ for all $f \in X'$ implies $x_0 = 0$.

8. **True/False**: When considered on $\mathbb{R}^n$, the norms $\|\cdot\|_{\infty}$ and $\|\cdot\|_1$ imply the same topology, but they are not equivalent.

9. **True/False**: The function $f$ defined by $f(x) = |x|^{1/2}/2$ satisfy a Lipschitz condition in $[-1,1]$. 

10. **True/False**: Unfortunately, the norm $\|x\| = \max_{t \in [a,b]} |x(t)|$ for $x \in C[a, b]$ can not be obtained from an inner product.

11. **True/False**: If a linear operator is continuous at 0, it is bounded.

12. If $x$ is an exact quantity and $\tilde{x}$ is an approximation to $x$, what is the error; $e = x - \tilde{x}$, or $e = \tilde{x} - x$? Does it matter? How does this *sign convention* define the term ‘residual’?