Calculus BC HW # 3

For each of the following questions enter a T (true) or F (false), as appropriate, on the line at the beginning of the statement.

______(1) The function $\sin(x)$ is defined for all real values of x.

______(2) For all real values x, it follows that $\sin^2(x) = \cos^2(x) - 1$.

______(3) For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, it follows that $\tan(x)\cos(x) = \sin(x)$.

______(4) For $0 < x < \frac{\pi}{2}$, it follows that $\tan(x)\cot(x) = 1$.

______(5) For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, it follows that $\cos(x)\sec(x) = 1$.

______(6) For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, it follows that $\tan^2(x) - \sec^2(x) = 1$.

______(7) For $0 < x < \pi$, it follows that $\csc(x)\sin(x) = 1$.

______(8) For all $x \in \mathbb{R}$, it follows that $0 \leq \sin(x) \leq 1$.

______(9) The function $\sin^{-1}(x)$ is defined for all real values of x.

______(10) For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, it follows that $1 + \tan(x) > 1$.

______(11) For $-1 \leq x \leq 1$, it follows that $\sin(\sin^{-1}(x)) = x$.

______(12) The function $\tan^{-1}(x)$ is defined for all real values of x.

______(13) For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, it follows that $1 + \tan^2(x) = \sec^2(x)$.

______(14) For all real values of x, it follows that $\sin(x + \frac{\pi}{2}) = \cos(x)$.

______(15) For all real values of x, it follows that $\sin(x) + \cos(x) = \cos(2x)$.

______(16) For all real values of x, it follows that $2\sin(x)\cos(x) = \sin(2x)$.

______(17) For all real values of x, it follows that $1 - 2\sin^2(x) = \cos(2x)$.

______(18) For all real values of x, it follows that $2\cos^2(x) - 1 = \cos(2x)$.

______(19) For all real values of θ, it follows that $\cos\left(\frac{\theta}{2}\right) = \frac{\cos(\theta)+1}{2}$.

For each of the following questions enter a T (true) or F (false), as appropriate, on the line at the beginning of the statement.

______(7) Even though the function e^x is defined for all real numbers x, its inverse function $\ln x$, is defined for only positive real numbers.

______(8) The function e^x, $x \in \mathbb{R}$, never assumes a negative value.

______(9) The function $\log_2 x$, $x \in \mathbb{R}$, never assumes the value 0.

______(10) Even though the function $\ln e^x$ is defined for all real numbers x, the function $e^{\ln x}$ is not defined for all real numbers x.

______(11) The graphs of the functions e^x, $-\infty < x < \infty$, and $\ln x$, $0 < x < \infty$, never intersect each other.

______(12) $(4)^\pi = 3^{\pi \log_3 4}$.

______(13) Let x denote a positive real number. If a and b denote real numbers, then $(x^a)(x^b) = x^{ab}$.

______(14) Let x denote a positive real number. If a and b denote real numbers, then $(x^a)^b = x^{ab}$.

______(15) Let x denote a positive real number. If a denotes a real number, then $x^{-a} = (\frac{1}{x})^a$.

______(16) Let x and y denote positive real numbers with $x < y$. If a denotes a real number, then $x^a < y^a$.

______(17) Let x denote a positive real number. If a and b denote real numbers, then $x^a + x^b = x^{a+b}$.