Problem Set 1: Background Review

Key Skills: Algebra, Trigonometry, Fractions, Exponents, Logarithms.

Let x, y, a, b be real numbers, positive and non-zero when necessary. Determine whether the following statements are true or false.

$\frac{a}{b} + \frac{a}{c}$	$=$	$\frac{a}{b+c}$	T	F
$(x-y)^2$	$=$	$x^2 - y^2$	T	F
$(2^a)^b$	$=$	2^{a+b}	T	F
$\frac{1}{\frac{1}{x}}$	$=$	$\frac{1}{x}$	T	F
x^{-2}	$=$	$\frac{x}{2}$	T	F
2^{3x}	$=$	6^x	T	F
$2^x 2^y$	$=$	2^{xy}	T	F
$\frac{1}{\sin x}$	$=$	$\sec x$	T	F
$\frac{x+1}{x^2-1}$	$=$	$\frac{1}{x} - 1$	T	F
$\frac{1}{x} + 1$	$=$	$\frac{x}{x+1}$	T	F
$\sqrt{x^2 - x^4}$	$=$	$x^2\sqrt{1-x^2}$	T	F

$\frac{a}{c} - \frac{b}{d}$	$=$	$\frac{a-b}{c-d}$	T	F
$\frac{\frac{a}{b}}{\frac{c}{d}}$	$=$	$\frac{ac}{bd}$	T	F
$x^3 - y^3$	$=$	$(x-y)^3$	T	F
$b\log_2 a$	$=$	$(\log_2 a)^b$	T	F
$\log_2 \frac{a}{b}$	$=$	$\frac{\log_2 a}{\log_2 b}$	T	F
$(\sqrt{x}+\sqrt{y})(\sqrt{x}-\sqrt{y})$	$=$	$x+y$	T	F
$\sqrt{\frac{x}{y}}$	$=$	$\frac{\sqrt{x}}{y}$	T	F
$\sin 2x$	$=$	$2\sin x$	T	F
$\sin\left(x+\frac{\pi}{2}\right)$	$=$	$\sin x + \sin\frac{\pi}{2}$	T	F
$\sin^2 x$	$=$	$1+\cos^2 x$	T	F
$\tan^2 x \cot^2 x$	$=$	$\sin^2 x$	T	F
$\frac{1}{1+\frac{1}{x}}$	$=$	$\frac{x+1}{x}$	T	F
$\frac{1}{x^{-\frac{1}{2}}}$	$=$	$\frac{x}{2}$	T	F

Answers

Let x, y, a, b be real numbers, positive and non-zero when necessary. Review the solutions to this true-false quiz. For each entry, construct a different right-side to the equation to fix the error.

$\frac{a}{b} + \frac{a}{c}$	$=$	$\frac{a}{b+c}$	T	F	$\frac{ac+ab}{bc}$
$(x-y)^2$	$=$	$x^2 - y^2$	T	F	$x^2 - 2xy + y^2$
$(2^a)^b$	$=$	2^{a+b}	T	F	2^{ab}
$\frac{1}{\frac{1}{x}}$	$=$	$\frac{1}{x}$	T	F	x
x^{-2}	$=$	$\frac{x}{2}$	T	F	$\frac{1}{x^2}$
2^{3x}	$=$	6^x	T	F	8^x
$2^x 2^y$	$=$	2^{xy}	T	F	2^{x+y}
$\frac{1}{\sin x}$	$=$	$\sec x$	T	F	$\csc x$
$\frac{x+1}{x^2-1}$	$=$	$\frac{1}{x} - 1$	T	F	$\frac{1}{x-1}$
$\frac{1}{x} + 1$	$=$	$\frac{x}{x+1}$	T	F	$\frac{1+x}{x}$
$\sqrt{x^2 - x^4}$	$=$	$x^2\sqrt{1-x^2}$	T	F	$x\sqrt{1-x^2}$

$\frac{a}{c}-\frac{b}{d}$	$=$	$\frac{a-b}{c-d}$	T	F	$\frac{ad-bc}{cd}$
$\frac{\frac{a}{b}}{\frac{c}{d}}$	$=$	$\frac{ac}{bd}$	T	F	$\frac{ad}{bc}$
x^3-y^3	$=$	$(x-y)^3$	T	F	$x^3-3x^2y+3xy^2-y^3$
$b\log_2 a$	$=$	$(\log_2 a)^b$	T	F	$\log_2(a^b)$
$\log_2\frac{a}{b}$	$=$	$\frac{\log_2 a}{\log_2 b}$	T	F	$\log_2 a-\log_2 b$
$(\sqrt{x}+\sqrt{y})(\sqrt{x}-\sqrt{y})$	$=$	$x+y$	T	F	$x-y$
$\sqrt{\frac{x}{y}}$	$=$	$\frac{\sqrt{x}}{y}$	T	F	$\frac{\sqrt{x}}{\sqrt{y}}$
$\sin 2x$	$=$	$2\sin x$	T	F	$2\sin x\cos x$
$\sin\left(x+\frac{\pi}{2}\right)$	$=$	$\sin x+\sin\frac{\pi}{2}$	T	F	$\cos x$
$\sin^2 x$	$=$	$1+\cos^2 x$	T	F	$1-\cos^2 x$
$\tan^2 x\cot^2 x$	$=$	$\sin^2 x$	T	F	1
$\frac{1}{1+\frac{1}{x}}$	$=$	$\frac{x+1}{x}$	T	F	$\frac{x}{x+1}$
$\frac{1}{x^{-\frac{1}{2}}}$	$=$	$\frac{x}{2}$	T	F	$\sqrt{x}$