

No Calculators

Problems 19-20 Time limit: 10 minutes.

- 19) A truth table is made for the logic expression $[p \wedge (q \vee r)] \rightarrow q$, where symbols \wedge represents “and”, \vee represents “exclusive or”, and \rightarrow represents “implies”. Of the eight cases for p, q, and r, for how many of them will the statement $[p \wedge (q \vee r)] \rightarrow q$ be true? (Note, “exclusive or” $p \vee q$ is true when either p or q is true but not both.)
- 20) Point S is in the interior of triangle PQR such that \overline{RS} bisects $\angle PRS$ and \overline{QS} bisects $\angle PQS$. If $m\angle QPR = 88^\circ$, find the degree-measure of $\angle QSR$.

Problems 21-22 Time limit: 10 minutes.

- 21) (a classic) The radii of two concentric circles are 10 and 26. Find the length of a chord of the larger circle which is tangent to the smaller circle.
- 22) Find all ordered pairs of integers (x, y) such that $1 + 2x + 3y = xy$.

Problems 23-24 Time limit: 10 minutes.

- 23) A function f is even if $f(-x) = f(x)$ for all x. A function f is odd if $f(-x) = -f(x)$ for all x. Suppose that function g is odd and function h is even. Completely simplify the expression $\frac{g(-4)+h(-2)+h(2)+g(4)}{h(2)+g(0)}$.
- 24) Find all exact real numbers x, with $0 \leq x < 2\pi$, such that $2 \cos(2x) - 1 = 0$.

Answers:	19)	7	20)	134
	21)	48	22)	$(4,9),(10,3),(2,-5),(-4,1)$
	23)	2	24)	$\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$