Roof Framing Calculations

• **Span**. In roof framing, span is the horizontal distance from the outside of one exterior wall to the outside of the other (opposing) exterior wall.

• **Slope**. Slope is the inclination of the roof surface expressed as the relationship of rise to run. It is expressed in a ratio as the unit of rise in inches, to run in inches, which is always 12 (y/x or $y/12$).

• **[Total] Run**. Run is the horizontal distance from the outside of the top plate of an exterior wall to the center line of the ridge-board. This is normally ½ the span.

TOTAL RUN = SPAN ÷ 2

• **Odd Unit**. In roof framing, an odd unit is any amount of the run that is less than a foot.

ODD UNIT = TOTAL RUN (in inches) – 12x, where x = total number of feet

• **Projection.** The *horizontal measurement* of the how far a rafter extends beyond the building is its projection.

• **[Total] Rise**. Rise is the total height of the roof from the top plate to the top of the ridge.

• **Line Length.** Line length is the actual length of the rafter, measured as the hypotenuse of a triangle. It is found by using the Pythagorean Theorem with the run (in inches) plus projection as the base, and the total rise (in inches) as the leg of a right triangle. This length may be simplified to Feet + Inches.

LINE LENGTH^2 = (TOTAL RUN + PROJECTION)^2 + TOTAL RISE^2

• **Pitch.** Pitch is the relationship between the total rise (in inches) to the span (in inches), expressed as a ratio.

PITCH = TOTAL RISE / SPAN

Exercise (25 pts.)

			a.	b.		c.	d.	e.
	Span	**Slope**	**[Total] Run**	**Odd Unit**	**Projection**	**[Total] Rise**	**Line Length**	**Pitch**
EX.	6’ – 0”	3/12	3’ – 0”	0”	6”	9”	42 $^{15}/_{16}$”	9”/72” = 1/8
1.	10’ – 0”	4/12			0”			
2.	15’ – 0”	5/12			6”			
3.	21’ – 10”	6/12			12”			
4.	20’ – 7 ½”	4/12			6”			
5.	22’ - 9 ½”	5/12			18”			