

## Razones trigonométricas del ángulo diferencia

### Seno

$$\operatorname{sen}(\alpha - \beta) = \operatorname{sen}(\alpha + (-\beta)) = \operatorname{sen} \alpha \cos(-\beta) + \cos \alpha \operatorname{sen}(-\beta) = \operatorname{sen} \alpha \cos \beta - \cos \alpha \operatorname{sen} \beta$$

C.Q.D.

### Coseno

$$\operatorname{cos}(\alpha - \beta) = \operatorname{cos}(\alpha + (-\beta)) = \operatorname{cos} \alpha \operatorname{cos}(-\beta) - \operatorname{sen} \alpha \operatorname{sen}(-\beta) = \operatorname{cos} \alpha \operatorname{cos} \beta + \operatorname{sen} \alpha \operatorname{sen} \beta$$

C.Q.D.

### Tangente

$$\operatorname{tg}(\alpha - \beta) = \operatorname{tg}(\alpha + (-\beta)) = \frac{\operatorname{tg} \alpha + \operatorname{tg}(-\beta)}{1 - \operatorname{tg} \alpha \operatorname{tg}(-\beta)} = \frac{\operatorname{tg} \alpha - \operatorname{tg} \beta}{1 + \operatorname{tg} \alpha \operatorname{tg} \beta}$$

C.Q.D.