4.

Addition formula for sine and for cosine (C)

It more difficult to see that there are identities for the sine and cosine of the sum of two angles:

$$cos(A + B) = cos(A)cos(B) – sin(A)sin(B)$$

and

$$sin(A + B) = sin(A)cos(B) + cos(A)sin(B)$$

Exercises:

1. If $cos(A) = 3/5$, $sin(A) = 4/5$, $cos(B) = 5/13$ and $sin(\theta) = 12/13$ find the sine and cosine of $A+B$.
2. If $cos(A) = -3/5$, $sin(A) = 4/5$, $cos(B) = 5/13$ and $sin(\theta) = -12/13$ find the sine and cosine of $A+B$.
3. Show that if $h \neq 0$ then

$$\frac{\cos(A+h)-\cos(A)}{h} = -\sin(A)\frac{\sin(h)}{h} - \cos(A)\frac{1-\cos(h)}{h}$$

and

$$\frac{\sin(A+h)-\sin(A)}{h} = -\cos(A)\frac{\sin(h)}{h} - \sin(A)\frac{1-\cos(h)}{h}$$

4.

Using the odd and even properties of sine and cosine, derive the subtraction identities

$$cos(A - B) = cos(A)cos(B) + sin(A)sin(B)$$

and

$$sin(A - B) = sin(A)cos(B) - cos(A)sin(B).$$

This shows that the subtraction identities should not be committed to memory.

5. If $cos(A) = 3/5$, $sin(A) = 4/5$, $cos(B) = 5/13$ and $sin(\theta) = 12/13$ find the sine and cosine of A-B.

6. If $cos(A) = -3/5$, $sin(A) = 4/5$, $cos(B) = 5/13$ and $sin(\theta) = -12/13$ find the sine and cosine of A-B.