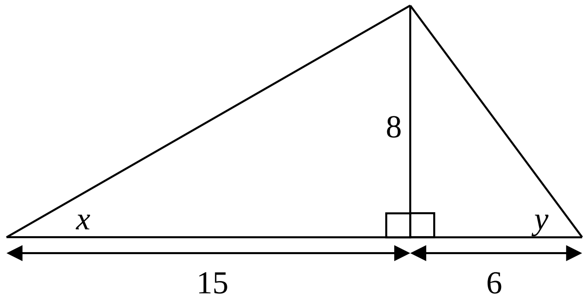
CNHS Higher HW Solutions

Week 9 [05/04/19]

Qs 121 - 135

121. The diagram below shows two right-angled triangles.



Find the exact value of $\cos(x+y)$.

$\mathbf{\frac{13}{85}}$

122. Expand and simplify $2\sin\left(x+\frac{\pi}{6}\right)-2\cos x$.

[*Hint*: use the formula $\sin(A+B)=\sin A\cos B+\cos A\sin B$]

$\mathbf{\sqrt{3}\ \sin x - \cos x}$

123. The acute angles A and B are such that $\sin A=\frac{4}{5}$ and $\sin B=\frac{2}{\sqrt{5}}$.

Find the exact value of $\sin(A+B)$.

[*Hint*: use the formula $\sin(A+B)=\sin A\cos B+\cos A\sin B$.]

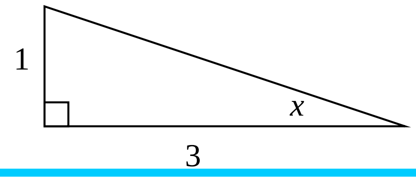
$\mathbf{\frac{9}{5\sqrt{5}}}$

124. Solve the equation $\sin 2x-\sqrt{3}\sin x=0$ for $0\le x\le 2\pi$.

[*Hint*: remember that $\sin 2x=2\sin x\cos x$]

$\mathbf{x = 0,\ \frac{\pi}{6},\ \pi,\ \frac{11\pi}{6},\ 2\pi}$

125. The diagram shows a right-angled triangle.
Find the exact values of $\sin 2p$ and $\cos 2p$.



sin2p = $\frac{4}{5}$ **cos2p** = $\frac{-3}{5}$

126. Solve each equation for $0 \le x \le 360$:

(a) $\cos 2x° + 3\cos x° + 2 = 0$ (b) $\cos 2x° + 7\sin x° = 4$

[*Hint*: replace $\cos 2x°$ with an appropriate formula in each equation]

(a) 120^0 180^0 240^0 (b) 30^0 150^0 (note that sinx = 3 is discarded)

127. If $\cos 2x = \frac{7}{25}$ and $0 < x < \frac{\pi}{2}$, find the values of $\cos x$ and $\sin x$.

[*Hint*: use a formula for $\cos 2x$]

cos x = $\frac{4}{5}$ **and sin x** = $\frac{3}{5}$

128. Express $3\cos x° + 2\sin x°$ in the form $k\cos(x - a)°$ where $k > 0$ and $0 \le a < 360$.

$\sqrt{13}\cos(x - 33.7)^0$

129. The expression $\sqrt{3}\cos x + \sin x$ can be expressed in the form $k\cos(x - a)$, where $k > 0$ and $0 < a < \frac{\pi}{2}$. Find the values of *k* and *a*.

k = 2 a = $\frac{\pi}{6}$

130. (a) Write $2\sin x° + \sqrt{5}\cos x°$ in the form $k\sin(x + a)°$, where $k > 0$ and $0 < x < 90$.

(b) Hence write down the maximum and minimum values of the function $f(x) = 2\sin x^\circ + \sqrt{5}\cos x^\circ + 1$, where x is a real number.

(a) $3\sin(x + 48.2)^0$ (b) Max = 4, Min = - 2

131. Express $2\sqrt{2}\sin x + 2\sqrt{2}\cos x$ in the form $k\sin(x + a)$, where $k > 0$ and $0 < a < \frac{\pi}{2}$.

$4\sin(x+\frac{\pi}{4})$

132. Use the chain rule to find $f'(x)$ when:

(a) $f(x) = (5x+2)^4$ (b) $f(x) = (x^2+1)^6$

(a) $f'(x)=4(5x+2)^3 x5$
$=\mathbf{20(5x+2)^3}$

(b) $f'(x)=6(x^2+1)^5 x(2x)$
$=\mathbf{12x(x^2+1)^5}$

133. Given that $y = 3\sin x + \cos 2x$, find $\frac{dy}{dx}$.

$\frac{dy}{dx}$ = **3cosx – 2sin2x**

134. Given that $f(x) = \sqrt{3x^2 + 2}$, use the chain rule to find $f'(x)$.

$f(x) = (3x^2+2)^{\frac{1}{2}}$ …$f'(x)= \frac{1}{2}(3x^2+2)^{\frac{-1}{2}}.6x = 3x(3x^2+2)^{\frac{-1}{2}}$

135. Given $f(x) = 4\sin 3x$, find the value of $f'(0)$.

$f'(x)=12\cos 3x$…$f'(0)=12\cos 0=12 \times 1=$**12**