Find the derivative of the function.

1) $f(x) = 4x^{½} + 5x^{½} = 9x^{1/2}$

$f'(x) = \frac{9}{2}x^{-1/2} = \boxed{\frac{9}{2\sqrt{x}}}$

2) $g(x) = \sqrt{1+4x^2}$

$g(x) = u^{1/2}$ $\quad u = 1+4x^2$

$g'(x) = \frac{1}{2}u^{-1/2} \cdot u'$ $\quad u' = 8x$

$= \frac{8x}{2\sqrt{1+4x^2}} = \boxed{\frac{4x}{\sqrt{1+4x^2}}}$

3) $f(x) = (5-3x)^{2/3}$

$f(x) = u^{2/3}$ $\quad u = 5-3x$

$f'(x) = \frac{2}{3}u^{-1/3} \cdot u'$ $\quad u' = -3$

$= \frac{-6}{3\sqrt[3]{5-3x}} = \boxed{\frac{-2}{\sqrt[3]{5-3x}}}$

4) $g(y) = \frac{1}{\sqrt{25-y^2}}$

$g(y) = u^{-1/2}$ $\quad u = 25-y^2$

$g'(y) = -\frac{1}{2}u^{-3/2} \cdot u'$ $\quad u' = -2y$

$= \frac{-2y}{2\sqrt{(25-y^2)^3}} = \boxed{\frac{-y}{\sqrt{(25-y^2)^3}}}$

5) $h(t) = 2\cos\sqrt{t}$

$h(t) = 2\cos u$ $\quad u = t^{1/2}$

$h'(t) = -2\sin u \cdot u'$ $\quad u' = \frac{1}{2}t^{-1/2} = \frac{1}{2\sqrt{t}}$

$= \frac{-2}{2\sqrt{t}} \cdot \sin\sqrt{t} = \boxed{\frac{-\sin\sqrt{t}}{\sqrt{t}}}$

6) $g(r) = \cot\sqrt{3r}$

$g(r) = \cot u$ $\quad u = (3r)^{1/2}$

$g'(r) = -\csc^2 u \cdot u'$ $\quad u' = \frac{1}{2}(3r)^{-1/2} \cdot 3$

$= -\csc^2\sqrt{3r} \cdot \frac{3}{2\sqrt{3r}}$ $\quad u' = \frac{3}{2\sqrt{3r}}$

$= \boxed{\frac{-3\csc^2\sqrt{3r}}{2\sqrt{3r}}}$