**COLLEGE ALGEBRA QUIZ**

(1) Given that $f(x) = 3x - 1, g(x) = x^2 + 1$, and $h(x) = 4 - x^3$, find $(f \circ g)(-1)$, $(h \circ f)(2)$, and $(g \circ g)(x)$.
Solution: $(f \circ g)(-1) = 5$, $(h \circ f)(2) = -4$, and $(g \circ g)(x) = 3x^2 + 2$

(2) Given that $f(x) = \frac{1}{x^2}$ and $g(x) = 3 - 4x$, find $(f \circ g)(x)$ and its domain. Then find $(g \circ f)(x)$ and its domain.
Solution: $(f \circ g)(x) = \frac{1}{3-4x^2}$, domain: $(-\infty, \frac{3}{4}) \cup (\frac{3}{4}, \infty)$.
$(g \circ f)(x) = 3 - \frac{4}{x^2}$, domain: $(-\infty, 0) \cup (0, \infty)$

(3) Given, $f(x) = 4(2x - 1)^3 + 7$, find $h(x)$ and $g(x)$ such that $f(x) = (h \circ g)(x)$.
Solution: $(h \circ g)(x) = 4(2x - 1)^3 + 7$ if $h(x) = 4x^3 + 7$, and $g(x) = 2x - 1$

(4) For $f(x) = 2x + 1$ and $g(x) = \sqrt{x}$, find the domain of $(g \circ f)(x)$.
Solution: $(g \circ f)(x) = \sqrt{2x + 1}$, domain:$[-\frac{1}{2}, \infty)$

(5) The surface area, $S$, of a cone is given by the formula, $S = \pi r^2 + \pi r\sqrt{h^2 + r^2}$. If the height, $h$, is four times the radius, $r$, find the function $S(r)$, the surface area as a function of the radius, and $S(h)$, the surface area as a function of the height.
Solution: $S(r) = \pi r^2(1 + \sqrt{17})$
$S(h) = \frac{1}{4}\pi h^2(\frac{1}{4} + \sqrt{1 + \frac{1}{16}})$