AM Objective #12: Find compositions of 2 functions

1. If $f(x) = x^4$ and $g(x) = 1-2x^2$, find $g(f(x))$.

[A] $1-2x^8$ [B] $\frac{x^4}{1-2x^2}$ [C] $(1-2x^2)^4$ [D] x^4-2x^6

(2)

$g(f(x)) = g(x^4) = 1-2(x^4)^2$

$= 1-2x^8$

2. Given $f(x) = \frac{x+5}{x}$ and $g(x) = x^2+4$, find $(g \circ f)(6)$.

[A] $\frac{520}{121}$ [B] $\frac{9}{8}$ [C] $\frac{265}{36}$ [D] $\frac{35}{6}$

$f(6) = \frac{6+5}{6} = \frac{11}{6}$

$g(f(6)) = g\left(\frac{11}{6}\right) = \left(\frac{11}{6}\right)^2 + 4$

$= \frac{121}{36} + 4 \cdot \frac{36}{36}$

$= \frac{121}{36} + \frac{144}{36}$

$= \frac{265}{36}$

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3. Given $f(x) = x^3$ and $g(x) = 2 - 3x$, find $(g \circ f)(x)$.

[A] $2 - 3x^3$ [B] $(2 - 3x)^3$ [C] $2x^3 - 3x^4$ [D] $\frac{x^3}{2 - 3x}$

$g(f(x)) = g(x^3) = 2 - 3(x^3)$

$= 2 - 3x^3$

4. If $f(x) = x^3$ and $g(x) = 3 - 6x$, find $(g \circ f)(x)$.

[A] $3x^3 - 6x^4$ [B] $(3 - 6x^3)$ [C] $\frac{x^3}{3 - 6x}$ [D] $(3 - 6x)$

$g(f(x)) = g(x^3) = 3 - 6x^3$