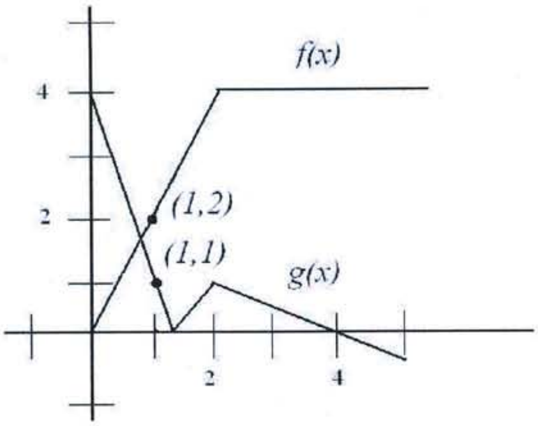
Use the following graph to answer questions 1 and 2.



1. Let $H(x) = f(x)g(x)$; find $H'(1)$

a) -6

b) 0

c) -1

d) 2

e) -4

2. Let $P(x) = g(2f(x))$; find $P'(1)$.

a) 0

b) -2

c) -1

d) $-\frac{1}{2}$

e) $\frac{3}{2}$

3. Express the limit as a derivative and evaluate: $\lim_{h\to 0} \frac{\sqrt[3]{8+h}-2}{h}$.

a) $\frac{1}{3\sqrt[3]{4}}$

b) 2

c) $\frac{1}{12}$

d) $\sqrt[3]{2}$

e) $\frac{1}{2}$

4. Evaluate the limit: $\lim_{x\to 0} \frac{x \sin 2x}{\tan^2 3x}$.

a) $\frac{2}{9}$

b) $\frac{3}{2}$

c) $\frac{2}{3}$

d) 0

e) $\frac{9}{2}$

5. Find $f'(x)$ for the function: $f(x) = \cos\sqrt{x^2+1}$.

a) $\frac{-x\sin\sqrt{x^2+1}}{\sqrt{x^2+1}}$

b) $-\sin\sqrt{x^2+1}$

c) $\frac{-\sin\sqrt{x^2+1}}{2\sqrt{x^2+1}}$

d) $-\sin\sqrt{x^2+1} + \frac{1}{2\sqrt{x^2+1}}$

e) $-\sin\sqrt{x^2+1} + \frac{1}{2\sqrt{x^2+1}} + 2x$

6. Find y' if: $y = \frac{\tan x^2}{x^2+1}$.

a) $\frac{(2x^2+2)\tan x \sec^2 x - 2x\tan x^2}{(x^2+1)^2}$

b) $\frac{(2x^3+2x)\sec^2 x^2 - 2x\tan x^2}{(x^2+1)^2}$

c) $\frac{\sec^2 2x}{2x}$

d) $\frac{(2x\sec^2 2x - 2x\tan x^2}{(x^2+1)^2}$

e) $\frac{(2x\tan x^2 - 2x\sec^2 2x}{(x^2+1)^2}$

7. For what value of c does the graph of $y = x^3 + \frac{c}{x}$ have a horizontal tangent line when $x = 2$.

a) -16

b) 12

c) There is no such value c.

d) 48

e) 0

1) $H'(x) = f(x) \cdot g'(x) + g(x) \cdot f'(x)$

$H'(1) = f(1) \cdot g'(1) + g(1) \cdot f'(1)$

$2 \cdot (-3) + (1)2$

$-6 + 2$

$\boxed{E}$ -4

2) $p'(x) = g'(2f(x)) \cdot 2f'(x)$

$p'(1) = g'(2 \cdot f(1)) \cdot 2f'(1)$

$= g'(2 \cdot 2) \cdot 2f'(1)$

$= g'(4) \cdot 2 \cdot f'(1)$

B $\left(-\frac{1}{2}\right) \cdot 2 \cdot 2$

$-1 \cdot 2$

-2

3) $\lim_{h \to 0} \frac{\sqrt[3]{8+h} - 2}{h}$ $f(x) = \sqrt[3]{x}$

$\boxed{C}$ $f'(8) = \frac{1}{3(\sqrt[3]{8})^2}$ $f'(x) = \frac{1}{3}x^{-2/3}$

$= \frac{1}{3 \cdot 4}$ $= \frac{1}{3(\sqrt[3]{x})^2}$

$= 1/12$

4. $\lim_{x\to 0} \frac{3}{3} \cdot \frac{2x}{2x} \cdot \frac{x\sin 2x}{\tan^2 3x}$

$\lim_{x\to 0} \frac{3x}{\tan 3x} \cdot \lim_{x\to 0} \frac{\sin 2x}{2x} \cdot \lim_{x\to 0} \frac{2x}{3\tan 3x} \cdot \frac{3}{3}$

$1 \cdot 1 \cdot \lim_{x\to 0} \left(\frac{2}{9} \cdot \frac{3x}{\tan 3x}\right)$

$\boxed{A}$ $\quad 1 \cdot 1 \cdot \frac{2}{9} \cdot \lim_{x\to 0} \frac{3x}{\tan 3x}$

$1 \cdot 1 \cdot \frac{2}{9} \cdot 1$

$= \boxed{\frac{2}{9}}$

5. $f(x) = \cos (x^2+1)^{1/2}$

$f'(x) = (-\sin \sqrt{x^2+1}) \cdot \frac{1}{2}(x^2+1)^{-1/2} \cdot 2x$

$\boxed{A}$ $\quad = \frac{-x \cdot \sin\sqrt{x^2+1}}{\sqrt{x^2+1}}$

6. $y' = \frac{(x^2+1)\sec^2(x^2)\cdot 2x - \tan(x^2)\cdot 2x}{(x^2+1)^2}$

$\boxed{B}$ $\quad y' = \frac{(2x^3+2x)\sec^2(x^2) - 2x\tan(x^2)}{(x^2+1)^2}$

7. $y' = 3x^2 - cx^{-2}$

$0 = 3x^2 - \frac{c}{x^2}$

$\boxed{D}$

$0 = 3x^4 - c$

$c = 3x^4$

when $x=2$ $\quad c = 3(2)^4$

$= 3(16)$

$= 48$