Chapter 3 Review

1. Find $\frac{dy}{dx}$ when $y = (4x+1)(1-x)^3$.

(A) $-12(1-x)^2$
(B) $(1-x)^2(1+8x)$
(C) $(1-x)^2(1-16x)$
(D) $3(1-x)^2(4x+1)$
(E) $(1-x)^2(16x+7)$

$\frac{dy}{dx} = (1-x)^3(4) + (4x+1)(3(1-x)^2(-1))$

$= (1-x)^2(4(1-x) - 3(4x+1))$

$= (1-x)^2(4-4x-12x-3)$

$= (1-x)^2(-16x+1)$

---

2. Find $\frac{dy}{dx}$ when $y = \sqrt{3-2x}$.

(A) $\frac{1}{2\sqrt{3-2x}}$
(B) $-\frac{1}{\sqrt{3-2x}}$
(C) $-\frac{(3-2x)^{3/2}}{3}$
(D) $-\frac{1}{3-2x}$
(E) $\frac{2}{3}(3-2x)^{3/2}$

$\frac{dy}{dx} = \frac{1}{2}(3-2x)^{-1/2}(-2)$

$= \frac{-1}{\sqrt{3-2x}}$

---

3. If $f(x) = \frac{2x}{x^3-7}$, then $f'(2)$ is equal to

(A) -50
(B) -46
(C) 46
(D) 48
(E) 50

$f'(x) = \frac{(x^3-7)(2) - (2x)(3x^2)}{(x^3-7)^2}$

$= \frac{2x^3-14-6x^3}{(x^3-7)^2}$

$= \frac{-4x^3-14}{(x^3-7)^2}$

$f'(2) = \frac{-4(2)^3-14}{(2^3-7)^2}$

$= \frac{-32-14}{1}$

$= -46$

---

4. If $g(t) = (7+4t)^5$, then the second derivative of g evaluated at $t = -2$ is

(A) -320
(B) 320
(C) 0
(D) -160
(E) 160

$g'(t) = 5(7+4t)^4(4)$

$20(7+4t)^4$

$g''(t) = 80(7+4t)^3(4)$

$= 320(7+4t)^3$

$g''(-2) = 320(7+4(-2))^3$

$= -320$

5. Find $\frac{dy}{dx}$ at $x = 1$ when $y = \sin(\cos(5x))$.

(A) $-5\sin(5)\cos(5)$
(B) $5(\sin(5))(\cos(\cos(5)))$
(C) $-5(\sin(5))(\cos(\cos(5)))$
(D) $5\sin(5)\cos(5)$

$\frac{dy}{dx} = \cos(\cos(5x)) \cdot -\sin(5x) \cdot 5$

$= -5\sin 5x(\cos(\cos(5x)))$

$\left.\frac{dy}{dx}\right|_{x=1} = -5\sin 5\cos(\cos 5)$

In 6-9, differentiable functions f and g have the values shown in the table.

x	f	f'	g	g'
0	2	1	5	-4
1	3	2	3	-3
2	5	3	1	-2
3	10	4	0	-1

6. If $A = f + 2g$, then $A'(3) =$.

(A) -2
(B) 2
(C) 7
(D) 8
(E) 10

$A'(x) = f'(x) + 2g'(x)$

$A'(3) = f'(3) + 2g'(3)$

$= 4 + 2(-1)$

$= 2$

7. If $H(x) = \sqrt{f(x)}$, then $H'(3) =$

(A) $\frac{1}{4}$
(B) $\frac{1}{2\sqrt{10}}$
(C) 2
(D) $\frac{2}{\sqrt{10}}$
(E) $\frac{4}{\sqrt{10}}$

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

$H'(3) = \frac{1}{2}(f(3))^{-1/2} f'(3)$

$= \frac{1}{2}(10)^{-1/2}\ 4$

$= \frac{2}{\sqrt{10}}$

8. If $P(x) = f(x^3)$, then $P'(1) =$

(A) 2
(B) 6
(C) 8
(D) 12
(E) 54

$P'(x) = f'(x^3) \cdot 3x^2$

$P'(1) = f'(1^3) \cdot 3(1)^2$

$= f'(1) \cdot 3$

$= 3(2)$

$= 6$

9. If $h(x)$ is the inverse of $f(x)$, then $h'(3) =$

(A) $\frac{1}{2}$

(B) $\frac{1}{3}$

(C) $\frac{1}{4}$

(D) $-\frac{1}{2}$

(E) 1

$f(1)=3 \rightarrow f'(1)=2$

$h(3)=1 \leftarrow h'(3)=\frac{1}{2}$

---

10. If $x^3 - xy + 4y = 1$, then $\frac{dy}{dx}$ at $x = 1$ is.

(A) -2

(B) 2

(C) -3

(D) 3

(E) -1

$1^3 - 1(y) + 4y = 1$

$1 + 3y = 1$

$3y = 0$

$y = 0$

$3x^2 - x\frac{dy}{dx} + y(-1) + 4\frac{dy}{dx} = 0$

$3 - \frac{dy}{dx} - 0 + 4\frac{dy}{dx} = 0$

$3\frac{dy}{dx} = -3$

$\frac{dy}{dx} = -1$
