

1. Let $f(x) = x^2 + \frac{2}{x^2}$, then $f'(-2) =$ $f'(x) = 2x - \frac{4}{x^3}$ $f'(-2) = -4 - \frac{4}{-8}$
 $= -\frac{7}{2}$
 (A) $-\frac{9}{2}$ (B) 5 (C) $-\frac{7}{2}$ (D) -8 (E) none of these

2. $\lim_{h \rightarrow 0} \left[\frac{5(x+h)^2 - 5x^2}{h} \right]$ (fast!!) = $\frac{d}{dx}(5x^2) = 10x$
 (A) $5x$ (B) $10x$ (C) $5x^2$ (D) $10x + 5h$ (E) none of these

3. If $y = \cos^2 \frac{x}{2} - \sin^2 \frac{x}{2}$,
 then $y' = 2\cos(\frac{x}{2})(-\sin(\frac{x}{2}))(\frac{1}{2}) - 2\sin(\frac{x}{2})\cos(\frac{x}{2})(\frac{1}{2}) = -2\sin \frac{x}{2} \cos \frac{x}{2}$
 $= -\sin x$
 (A) 0 (B) $\cos x$ (C) $\sin x$ (D) $-4\sin \frac{x}{2} \cos \frac{x}{2}$ (E) $-\sin x$

4. If $f(x) = 2\sin \frac{x}{2} + 8\cos \frac{x}{2}$, then $f'(\frac{\pi}{2}) =$ $f'(x) = (2\cos \frac{x}{2})\frac{1}{2} - (8\sin \frac{x}{2})(\frac{1}{2})$
 $f'(\frac{\pi}{2}) = \cos(\pi/4) - 4\sin \pi/4$
 $= \frac{\sqrt{2}}{2} - 4(\frac{\sqrt{2}}{2}) = -\frac{3\sqrt{2}}{2}$
 (A) $5\sqrt{2}$ (B) $-3\sqrt{2}$ (C) $-\frac{3\sqrt{2}}{2}$ (D) $3\sqrt{2}$ (E) $\frac{3}{\sqrt{2}}$

5. If $f(x) = (2x+1)^4$, then the 4th derivative of $f(x)$ at $x=0$ is $f'(x) = 4(2x+1)^3(2)$
 $f''(x) = 24(2x+1)^2(2)$
 $f'''(x) = 96(2x+1)(2)$
 $f^{(4)}(x) = 96(2)(2)$
 (A) 0 (B) 24 (C) 48 (D) 240 (E) 384

6. If $y = \frac{3}{4+x^2}$, then $\frac{dy}{dx} = -3(4+x^2)^{-2}(2x)$
 $y = 3(4+x^2)^{-1} = \frac{-6x}{(4+x^2)^2}$

- (A) $\frac{-6x}{(4+x^2)^2}$ (B) $\frac{3x}{(4+x^2)^2}$ (C) $\frac{6x}{(4+x^2)^2}$
 (D) $\frac{-3}{(4+x^2)^2}$ (E) $\frac{3}{2x}$

7. if $f(x) = x$, then $f'(5) =$

- (A) 0 (B) $\frac{1}{5}$ (C) 1 (D) 5 (E) $\frac{25}{2}$

8. The function defined by $f(x) = x^3 - 3x^2$ for all real numbers, x has a relative maximum at $x =$

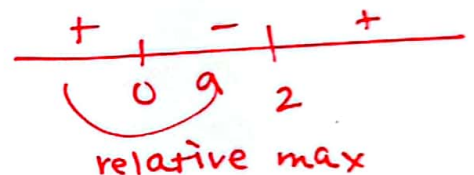
- (A) -2 (B) 0 (C) 1 (D) 2 (E) 4

9. If $\frac{dy}{dx} = \cos(2x)$, then $y =$

- (A) $-\frac{1}{2}\cos(2x) + c$ (B) $-\frac{1}{2}\cos^2(2x) + c$ (C) $\frac{1}{2}\sin(2x) + c$
 (D) $\frac{1}{2}\sin^2(2x) + c$ (E) $-\frac{1}{2}\cos(2x) + c$

$$f'(x) = 3x^2 - 6x = 0$$

$$3x(x-2) = 0$$



Answers:

Multiple Choice :

1. c 2. b 3. e 4. c 5. e 6. a 7. c 8. b 9. c

Free Response:

1. a) $t = 5$; b) velocity = 50ft/sec, speed = 50ft/sec, acceleration = 0ft/s²; c) $0 < t < 4$
 d) (5, 6)

2. a) $8x-4$ b) $4x\cos(2x^2+1)$; c) $\frac{5}{2} + \frac{3}{x^2} - \frac{8}{x^3}$

3. a) $v = -6t^2 + 12t$; b) $a = -12t + 12$; c) -4; d) -18; e) 18; f) -24; g) speeding up; h) left

4. a) $-10x^2$; b) $y = -10x^2 + c$; c) $y = -10x^2 + 11$

5. $y - 5 = \frac{-1}{12}(x - 1)$

6. check with other students