

Chapter 3 Test - Version A-A - Solutions

1. T

2. F

$$f(10) = 10 + 5(10) - .2(10)^2 = 40 \text{ not } 3$$

3. F

$$\begin{array}{l|l} f(x) = 4\cos(2x) & g(x) = \sin x^2 \\ f'(x) = -4\sin(2x) \cdot 2 & g'(x) = \cos x^2 \cdot 2x \\ f'(x) = -8\sin(2x) & g'(x) = 2x \cos(x)^2 \end{array}$$

4. T

$$\begin{aligned} f(x) &= 4\cos(2x) \\ f'(x) &= -4\sin(2x) \cdot 2 = -8\sin(2x) \end{aligned}$$

5. F

$$\frac{d}{dx}(y^4) = 3y^3$$

1. a) $m = 2x + 5$

b) 7

c) $y = 7x - 1$

a) $f(x) = x^2 + 5x$

$f'(x) = 2x + 5$

b) $x = 1$

$f'(1) = 2(1) + 5$

$= 7$

c) $y - b = 7(x - 1)$

$y = 7x - 7 + b = 7x - 1$

2. a) X_1, X_2, X_4, X_5

b) X_1, X_5

3. b

$f(x) = 2x^3 + 4x$

$f'(x) = 6x^2 + 4$

4. C

$$= n \text{Deriv}((1+x)/(1-x), x, 2)$$

$$= 2.000002$$

5. a, c, d

$$y = x^3 - 4x + 5$$

$$y' = 3x^2 - 4$$

6. C

$$y = x^3 - 2x^2$$

$$y' = 3x^2 - 4x$$

$$y'(-2) = 3(-2)^2 - 4(-2) = 12 + 8 = \boxed{20 = m}(-2, -16)$$

$$y + 16 = 20(x + 2)$$

$$y = 20x + 40 - 16$$

$$y = 20x + 24 = 0$$

$$20x = 24$$

$$x = 1.2$$

x int	y int
(1.2, 0)	(0, 24)

7. C

$$= n \text{Deriv}(x^3 \sin(4x+3)/(x^2+5x+3), x, 4.5)$$

$$= -3.7628...$$

8. a - with x

b with y

c with w

d with z

9. $f(x) = \cos(x+4)$ since $-1 \leq \cos x \leq 1$,
 it has mins/maxs when $y = -1$, or 1 so...
 A, D

10. b

$$y = \sin\left(\frac{3\pi}{2}x\right)$$

$$y' = \frac{3\pi}{2} \cos\left(\frac{3\pi}{2}x\right)$$

$$y'(4) = \frac{3\pi}{2} \cdot \cos\left(\frac{3\pi}{2} \cdot 4\right)$$

$$y'(4) = \frac{3\pi}{2} \cdot 1 = \frac{3\pi}{2}$$

$$(4, 0)$$

$$y = \sin\left(\frac{3\pi}{2} \cdot 4\right)$$

$$y = 0$$

$$y - 0 = \frac{3\pi}{2}(x - 4)$$

$$y = \frac{3\pi}{2}x - 6\pi = y = 4.71x - 18.4$$

11. d.

$$\frac{d}{dx} \left[\frac{g(x)}{f(x)} \right]$$

when $x = 2$

$$\frac{4(-4) - \frac{2}{3} \cdot 7}{4^2} = \frac{-16 - \frac{14}{3}}{16} = \frac{-\frac{62}{3}}{16}$$

$$= \frac{-62}{3} \cdot \frac{1}{16} = \frac{-62}{48} = \boxed{\frac{-31}{24}}$$

12. a, d

$$x^2 - 4x = 4 - 4y^2$$

$$2x - 4 = -8y \frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{2x-4}{-8y} = 0, \text{ when } 2x-4=0$$

$$2x = 4$$

$$x = 2$$

$$2^2 - 4(2) = 4 - 4y^2$$

$$-4 = 4 - 4y^2 \rightarrow -8 = -4y^2 \rightarrow 2 = y^2 \quad y = \pm\sqrt{2}$$

$$(2, \pm\sqrt{2})$$

13. b, c

$$\frac{dy}{dx} = \frac{2x-4}{-8y} \text{ when } -8y=0$$

$$y=0$$

$$x^2 - 4x = 4 - 4(0)^2$$

$$x^2 - 4x = 4 \rightarrow x^2 - 4x - 4 = 0 \rightarrow x = \frac{4 \pm \sqrt{16 - 4(1)(-4)}}{2}$$

$$x = \frac{4 \pm \sqrt{32}}{2} = \frac{4 \pm \sqrt{16} \sqrt{2}}{2} = 2 \pm 2\sqrt{2}$$

$$(2 \pm 2\sqrt{2}, 0)$$

14. a, d

$$f''(x) = x^{-5/2}$$

$$a) f(x) = \frac{4}{3} x^{-1/2} + 9$$

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

$$f''(x) = x^{-5/2} \quad \text{yes}$$

b) No

$$c) f''(x) = x^{-5/2}$$

$$f'''(x) = -\frac{5}{2} x^{-7/2}$$

16. skip

$$17. s = x^3 - 7x^2 + 5x + 7$$

A. c

B. e

C. b

$$v = 3x^2 - 14x + 5$$

$$a = 6x - 14$$

$$s = |v| = |3x^2 - 14x + 5|$$

18. d

$$y = 3 \sin x - 2 \tan x$$

$$y' = 3 \cos x - 2 \sec^2 x$$

19. c

$$f(x) = \sqrt{2} \sin x \quad \text{at } x = \frac{\pi}{2}$$

$$f'(x) = \sqrt{2} \cos x$$

$$f'(\frac{\pi}{2}) = \sqrt{2} \cos \frac{\pi}{2}$$

$$= \sqrt{2} \cdot 0 = 0$$

skip

20. a. |.16|

b. 1

c. |.16|

21. b

$$y = \frac{(4x+3)^5 - 7x}{6}$$

22. b

$$y+1 = \frac{8}{13}(x-1)$$

$$y = \frac{8}{13}x - \frac{8}{13} - 1$$

$$13y = 8x - 8 - 13$$

$$8x - 13y = 21$$

$$x^2 + 3x^2y^4 - y - 5 = 0$$
$$2x + 6xy^4 + 3x^2 \cdot 4y^3 \frac{dy}{dx} - \frac{dy}{dx} = 0$$

$$12x^2y^3 \frac{dy}{dx} - \frac{dy}{dx} = -2x - 6xy^4$$

$$\frac{dy}{dx} (12x^2y^3 - 1) = -2x - 6xy^4$$

$$(1, -1) \frac{dy}{dx} = \frac{-2x - 6xy^4}{12x^2y^3 - 1} = \frac{-2 - 6}{-13 - 13} = \frac{-8}{-26} = \frac{4}{13}$$