

## Options for Test

① Tomorrow as Planned 5

② Tuesday 30

### Prac test 2 Solutions

$$1) f(x) = 2 \cdot 6^{\pi} - 8 \cdot 3^{2x} - \underbrace{3 \sin^4 x}_{\frac{3(\sin x)^4}{12(\sin x)^3 \cdot \cos x}}$$

$$f'(x) = 0 - 8 \cdot 3^{2x} \cdot \ln 3 \cdot 2 - 12 \sin^3 x \cdot \cos x$$

$$f'(x) = -16 \cdot 3^{2x} \cdot \ln 3 - 12 \sin^3 x \cos x$$

$$f'(x) = -4(4 \cdot 3^{2x} \cdot \ln 3 + 3 \sin^3 x \cos x)$$

PPP 1)  $f(x) = 3 \sin \pi - 4e^{-5x} + 7 \cdot 3^{5x}$

$$2) h(x) = \frac{3}{\sqrt[5]{8+4x^3}} = 3(8+4x^3)^{-1/5}$$

$$h'(x) = -\frac{3}{5}(8+4x^3)^{-6/5} \cdot 12x^2$$

$$h'(x) = \frac{-36x^2}{5\sqrt[5]{(8+4x^3)^6}}$$

PPP 2)  $f(x) = 7\sqrt[5]{3x+e^{4x}}$

$$3) g(x) = \frac{7x-3}{4x+11}$$

$$g'(x) = \frac{(4x+11)7 - (7x-3) \cdot 4}{(4x+11)^2}$$

$$g'(x) = \frac{28x+77-28x+12}{(4x+11)^2} = \frac{89}{(4x+11)^2}$$

PPP  $f(x) = \frac{3-10x}{2-13x}$

$$4) f(x) = \frac{7x^4}{3 \cos(5x)}$$

$$f'(x) = \frac{3 \cos(5x) \cdot 28x^3 - 7x^4 \cdot 3(-\sin(5x)) \cdot 5}{9 \cos^2(5x)}$$

$$f'(x) = \frac{84x^3 \cos(5x) + 105x^4 \sin(5x)}{9 \cos^2(5x)}$$

$$f'(x) = \frac{21x^3 (4 \cos(5x) + 5x \sin(5x))}{9 \cos^2(5x)}$$

$$f'(x) = \frac{7x^3 (4 \cos(5x) + 5x \sin(5x))}{3 \cos^2(5x)}$$

PPP

$$4) f(x) = \frac{3x^6}{4 \sin(9x)}$$

$$5) f(x) = 3x^6 e^{-2x}$$

$$f'(x) = 3x^6 (-2e^{-2x}) + e^{-2x} \cdot 18x^5$$

$$f'(x) = -6x^6 e^{-2x} + 18x^5 e^{-2x}$$

$$f'(x) = -6x^5 e^{-2x} (x - 3)$$

PPP

$$5) f(x) = 5x^7 e^{\pi x}$$

$$6) g(x) = \cos^9(4x^2) = [\cos(4x^2)]^9$$

$$g'(x) = 9[\cos(4x^2)]^8 (-\sin(4x^2)) \cdot 8x$$

$$g'(x) = -72x \cos^8(4x^2) \sin(4x^2)$$

PPP

$$6) f(x) = \tan^6(\cos(3x))$$

$$7) 5x^2 + 3y^3 = 15 + 7x \quad \text{at } (-1, 1)$$

$$10x + 9y^2 \frac{dy}{dx} = 7$$

$$10(-1) + 9 \cdot 1^2 \frac{dy}{dx} = 7$$

$$9 \frac{dy}{dx} = 17$$

$$\frac{dy}{dx} = \frac{17}{9}$$

$$l = \frac{17}{9}(-1) + b$$

PPP

7) Find eq. of tangent line  
to  $9x^2 + 4y^2 = 40$   
at the point  $(2, 1)$

$$\frac{a}{9} = -\frac{17}{9} + b$$

$$\frac{26}{9} = b$$

$$y = \frac{17}{9}x + \frac{26}{9}$$

8)  $4y^3 + 3x^5 y^2 + 2x^5 = 10 - 2y^2$

$$12y^2 \frac{dy}{dx} + \underbrace{3x^5 \cdot 2y \frac{dy}{dx} + y^2 \cdot 15x^4}_{\text{PRODUCT}} + 10x^4 = -4y \frac{dy}{dx}$$

$$12y^2 \frac{dy}{dx} + 6x^5 y \frac{dy}{dx} + 4y \frac{dy}{dx} = -15x^4 y^2 - 10x^4$$

$$\frac{dy}{dx} = \frac{-15x^4 y^2 - 10x^4}{12y^2 + 6x^5 y + 4y} = \frac{5x^4(-3y^2 - 2)}{2y(6y + 3x^5 + 2)}$$

PPP 8) Find  $\frac{dy}{dx}$  for  $7y^7 - 3x^2 y^3 + 8x^5 = (y^2 - 3)^3$

9)  $h(t) = \frac{1}{2}gt^2 + v_0t + h_0$

on Earth,  $g = -32 \frac{ft}{sec^2}$

a)  $h(t) = \frac{1}{2}(-32)t^2 + 48t + 64$

$$h(t) = -16t^2 + 48t + 64$$

$$v(t) = h'(t) = -32t + 48$$

$$a(t) = h''(t) = -32$$

b)  $v(t) = -32t + 48 = 0$

$$-32t = -48$$

$$t = 1.5 \text{ seconds}$$

c)  $h(1.5) = -16(1.5)^2 + 48(1.5) + 64$

$$h(1.5) = 100 \text{ ft}$$

d)  $h(t) = -16t^2 + 48t + 64 = 0$

$$-16(t^2 - 3t - 4) = 0$$

$$-16(t-4)(t+1) = 0$$

$$t = 4 \text{ or } t = -1$$

$$t = 4 \text{ seconds}$$

e)  $v(4) = -32 \cdot 4 + 48$

$$= -80 \text{ ft/sec}$$

PPP

9) On Planet Shennacosset,  $g = -20 \text{ ft/sec}^2$ .

a) Find  $h(t)$ ,  $v(t)$ , and  $a(t)$  if  $v_0 = 60 \text{ ft/sec}$  and  $h_0 = 70 \text{ ft}$

b) How long to highest height?

c) What is highest height?

d) How long to hit ground?

e) With what velocity does it hit ground?