Homework


HW #6

2.3 - 6 Differentiate the function

$$f(y) = \frac{2}{y^4} - y^3 + 2$$

$$f(y) = 2y^{-4} - y^3 + 2$$

$$f'(y) = 2\frac{d}{dy}(y^{-4}) - \frac{d}{dy}(y^3) + 2\frac{d}{dy}(1)$$

$$= 2(-4y^{-5}) - (3y^2) + 0$$

$$f'(y) = -8y^{-5} - 3y^2$$

DGK 2.5

36) a) $y = f(\sqrt{x})$

$y' = f'(\sqrt{x}) \cdot \frac{1}{2\sqrt{x}}$

b) $y = \sqrt{f(x)} = (f(x))^{1/2}$

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

c) $y = f(x f(x))$

$y' = f'(x f(x)) \cdot \underbrace{(x f'(x) + f(x))}_{\text{Product Rule}}$

# Double Helix

2.3 #16

$f'''(t)$ for $\boxed{f(t) = 4t^2 - 12 + \frac{4}{t^2}}$

$f'(t) = \frac{d}{dx}(4t^2) + \frac{d}{dx}(-12) + \frac{d}{dx}\left(\frac{4}{t^2}\right)$

$f'(t) = 2(4)t^{2-1} + \frac{1}{4}t^{-2-1}$

$f'(t) = 8t + \frac{1}{4}t^{-3}$

---

$f''(t) = \frac{d}{dt}(8t) + \frac{d}{dt}\left(\frac{1}{4}t^{-3}\right)$

$f''(t) = 1(8)t^{1-1} + (-3)\frac{1}{4}t^{-3-1}$

$f''(t) = 8 - \frac{3}{4}t^{-4}$

---

$f'''(t) = \frac{d}{dt}(8) + \frac{d}{dt}\left(-\frac{3}{\cancel{4}}t^{-4}\right)$

$f'''(t) = (-4)\left(-\frac{3}{\cancel{4}}\right)t$

$f'''(t) = 3t^{-5}$

DP- Derivative Rules

p. 152 / section 2.3 / 20

$f^{(5)}(x)$ for $f(x) = x^{10} - 3x^4 + 2x - 1$

$f(x) = x^{10} - 3x^4 + 2x - 1$

$f'(x) = 10x^9 - 12x^3 + 2$

$f''(x) = 90x^8 - 36x^2$

$f'''(x) = 720x^7 - 72x$

$f^{(4)}(x) = 5040x^6 - 72$

$f^{(5)}(x) = 30240x^5$

- Investment Bankers

2.3

28) $f(x) = x^2 - 2x + 1$, $a = 2$

Finding the equation of the Tangent line to $y = f(x)$ at $x = a$

$$f'(x) = 2x - 2 + 0$$

$$f'(x) = 2x - 2$$

$$f'(2) = 2(2) - 2$$

$$f'(2) = 4 - 2$$

$$f'(2) = 2$$

At $x = 2$, the slope of the Tangent line is then $f'(2) = 2$.

The line with slope 2 through the point $(\overset{a}{2}, \overset{b}{1})$ has the equation:

$$y - b = m(x - a)$$

$$y - 1 = 2(x - 2)$$

$$y - 1 = 2x - 4$$

$$\underline{\underline{y = 2x - 3}}$$

Patrick Wells

2.3 #52

I.T.

find $f'(t)$ $f''(t)$ for Avg weight of S.U.V.s

| * | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|
| $f(t)$ | 4055 | 4189 | 4353 | 4619 |

Quadreg $= 33x^2 + 20.6x + 4005$

$f'(t) = 66x + 20.6$

$f''(t) = 66$

Calc

Stat
↓
1.
Enter
↓

| | $L_1$ | $L_2$ |
|---|---|---|
| (1985) | 1 | 4055 |
| (1990) | 2 | 4189 |
| (1995) | 3 | 41353 |
| (2000) | 4 | 4619 |

↓
Stat
→
Quadreg
Enter
↓
Y=
Vars
5.
→
→
1.
Plot1
Enter
↓
Zoom
9.
↓
Y=
Y2
Math
8
VARS Y-vars 1 $(Y_1, x, x)$

Y2
Math
8.
$(Y_1, X, x)$
↓
Zoom
9.

T. Como

P. Wells

G. Rogers

MAT Finishers #4

Mo [illegible] - Julian Ward, Hiroaki Tanaka

$$f(x) = \overbrace{e^{2x}}^{f} \cdot \overbrace{\cos 4x}^{g}$$

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

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

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

# PURPLE PARROTS

2.4 # 8

$$f(x) = \frac{6x - \frac{2}{x}}{x^2 + \sqrt{x}}$$

$$f(x) = \frac{6x - 2x^{-1}}{x^2 + x^{\frac{1}{2}}}$$

$$f'(x) = \frac{(6 + 2x^{-2})(x^2 + x^{\frac{1}{2}}) - (6x - 2x^{-1})(2x + \frac{1}{2}x^{-\frac{1}{2}})}{(x^2 + x^{\frac{1}{2}})^2}$$

$$f'(x) = \frac{(6 + \frac{2}{x^2})(x^2 + \sqrt{x}) - (6x - \frac{2}{x})(2x + \frac{1}{2\sqrt{x}})}{(x^2 + \sqrt{x})^2}$$

2.4 #20

XMITS

$$f(x) = \frac{x+3}{x^2+1}, \quad a = 1$$

$f(x)$, $g(x)$

$$f(a) = \frac{4}{2} = 2$$

$$(1, 2)$$

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

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

$$= \frac{(x^2+1) - (2x^2+6x)}{(x^4+2x^2+1)}$$

$$f'(x) = \frac{-x^2 - 6x + 1}{x^4+2x^2+1}$$

$$y'(1) = \frac{-(1)^2 - 6(1) + 1}{(1)^4 + 2(1)^2 + 1}$$

$$y'(1) = \frac{-1-6+1}{1+2+1} = \frac{-6}{4} = -\frac{3}{2}$$

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

$$-9/4\, x + 1 = x + 3$$

$$-13/4\, x = \frac{2}{-13/4}$$

$$x = -8/13$$

$$y = -8/13\, x - 3/2$$

EQN OF LINE

$$y - 2 = -\frac{3}{2}(x - 1)$$

Abraham Sherman

Timothy Lukowicz

B10

2.4

50 $f(x) = \frac{1}{1+x^{2.7}}$ Find and Interpret $\lim\limits_{x\to 0} f(x)$, $\lim\limits_{x\to\infty}$ f(x) and f'(x)

$$\lim_{x\to 0} f(x) = 1$$

$$\lim_{x\to\infty} f(x) = 0$$

$$f'(x) = \sqrt[2.7]{\frac{-x+1}{x}}$$

$$f(x) = 1/1+x^{2.7}$$

$$x = 1/1 + f(x)^{2.7}$$

$$1 = x(1+f(x)^{2.7})$$

$$1 = x^4 + x\,f(x)^{2.7}$$

$$1 - xf(x)^{2.7} = x$$

$$xf(x)^{2.7} = -x+1$$

$$f(x) = \sqrt[2.7]{\frac{-x+1}{x}}$$