$\boxed{\text{H. Calc}}$

$$x^2 + y^2 = \overbrace{3xy}^{f\ g}$$

$f' = 3$

$g' = \frac{dy}{dx}$

find dy/dx

$$2x + 2y\frac{dy}{dx} = \cancel{3y} + 3x\frac{dy}{dx}$$

$$-3y \qquad\qquad \cancel{-3y}$$

$$2x - 3y + \cancel{2y\frac{dy}{dx}} = 3x\frac{dy}{dx}$$

$$\cancel{-2y\frac{dy}{dx}} \qquad -2y\frac{dy}{dx}$$

$$2x - 3y = 3x\frac{dy}{dx} - 2y\frac{dy}{dx}$$

$$\frac{2x-3y}{3x-2y} = \frac{\cancel{(3x-2y)}\frac{dy}{dx}}{\cancel{3x-2y}}$$

$$(x^2 + y^2)^2 = 2x$$

$$2(x^2+y^2)(2x+2y\frac{dy}{dx}) = 2$$

What is the Eq. of the line tangent to $y=(2x+1)^{1/3}$ @ $x=1$.

$$\boxed{f=(2x+1)^{1/3}}$$

$$\boxed{f'=}$$

$$\boxed{y=mx+b}$$

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

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

$$f'=\frac{2}{3(2x+1)^{2/3}} \qquad 3^{2/3}=(3^2)^{1/3}$$

$$f(1)=\sqrt[3]{3} \qquad (1,\sqrt[3]{3})$$

$$f'(1)=\frac{2}{3\sqrt[3]{9}}$$

$$y-y_1=m(x-x_1)$$

$$f(x) = \begin{cases} 3x + c, & x \le 2 \\ x^2 - 1, & x > 2 \end{cases}$$

find c to make f(x) cont.

left

right

$$6 + c = 3$$

$$\boxed{c = -3}$$

$$\lim_{x \to 0} \frac{\sin x}{x} = 1 \qquad \lim_{x \to 0} \frac{1-\cos x}{x} = 0$$

(Special Trig)

$$\lim_{x \to 7} \frac{x^2-49}{x-7}$$

$$\lim_{x \to 7} \frac{(x+7)\cancel{(x-7)}}{\cancel{x-7}}$$

$$\lim_{x \to 7} x+7 = 14$$

$$\lim_{x \to \infty} \frac{21x^5 - 3x^2 + 1}{22x^5 - 4x^2 + 3}$$

$$\boxed{y = \frac{21}{22}}$$

$$f' = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$- (5x^2 - 3x + 7)$$

$$\lim_{h \to 0} \frac{5(x+h)^2 - 3(x+h) + 7 - 5x^2 + 3x - 7}{h}$$

$$= 10x - 3$$

$F(x) = c \qquad f'(x) = 0$

$F(x) = cx \qquad f'(x) = c$

$F(x) = cx^n \qquad f' = c \cdot n \cdot x^{n-1}$

$F(x) = (G(x))^n \longrightarrow n(g(x))^{n-1} \cdot g'(x)$

$H(x) = F(x) + G(x) \qquad f'(x) + g'(x)$

$h = F(G(x))$ CHAIN RULE $h' = f'(g(x)) \cdot g'(x)$

ex factoring

$$\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$$

$$\lim_{x \to 3} \frac{(x+3)\cancel{(x-3)}}{\cancel{x-3}}$$

$$\lim_{x \to 3} x + 3 = 6$$

Rationalize

$$\lim_{x \to 36} \frac{2}{\sqrt{x} - 6} \cdot \frac{\sqrt{x} + 6}{\sqrt{x} + 6}$$

$$\lim_{x \to 36} \frac{2(\sqrt{x} + 6)}{x - 36}$$

$=$

$$f(x) = \begin{cases} x^2+5, & x \le 0 \\ x^3-2x, & x > 0 \end{cases}$$

Is f continuous? If not explain why.

$$5 \neq 0$$

© No, b/c. $\lim_{x \to 0^-} f(x) \neq \lim_{x \to 0^+} f(x)$

H.A.

$$\lim_{x \to \infty} \frac{2x^7 + 3x + 2}{5x^7 - 7x + 1} =$$

$2/5$

$$\lim_{x \to 3} \frac{-5}{(3-x)^2}$$

$$\frac{-5}{(0.001)^2} = \frac{-5}{.001} = -\infty$$

$$\frac{-5}{(-0.01)^2} \quad \frac{-5}{.01} = -\infty$$

V.A. $= -\infty$

Tangent line equation

$$y - y_1 = m(x - x_1)$$

$$f(x) = x^3 - 3x^2 + 2x - 5$$

@ $x = 1$

$f(1) = 1 - 3 + 2 - 5 = -5$ $\quad (1, -5)$

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

$f'(1) = -1$

$y - -5 = -1(x - 1)$

$y + 5 = -x + 1$

$y = -x - 4$

$h(x) = f(g(x))$

$h'(x) = f'(g(x)) \cdot g'(x)$

$h'(3) = f'(\underbrace{g(3)}_{\downarrow}) \cdot g'(3)$

$f'(2) \cdot -\frac{3}{2}$

$-1 \cdot -\frac{3}{2} = 3/2$