#2.5

7. $\frac{d}{dx}(4x^3-x)^{10}$

outer $f(x)$ x^{10}

inner $g(x)$ $4x^3-x$

$f'(g(x))\,g'(x)$

$f'(x) = 10x^9$

$10(4x^3-x)^9(12x^2-1)$

9. $f(x) = \theta^3$

$g(x) = \sin\theta + \cos\theta$

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

$3(\sin\theta+\cos\theta)^2 \cdot (\cos\theta - \sin\theta)$

11. $(\ln x + x^2)^3$

$f(x) = x^3$

$g(x) = (\ln x + x^2)$

$f'(g(x))g'(x)$

$3(\ln x + x^2)^2 \left(\frac{1}{x} + 2x\right)$

13. $\left(x + \frac{1}{x}\right)^4$

$f(x) = x^4$

$g(x) = x + \frac{1}{x}$ $\quad x^{-1} \quad -x^{-2}$

$f'(x) \; 4|x^3$

$g'(x) \; 1 - x^{-2}$

$4\left(x + \frac{1}{x}\right)^3 \left(1 - x^{-2}\right)$

$a \quad b$

$a \cdot b = 500$

max: $a + b$

$a = \frac{500}{b}$

$f(b) = \frac{500}{b} + b$

$\frac{1}{b} \Rightarrow b^{-1}$

$-b^{-2}$

$0 = \frac{-500}{b^2} + 1$

$-1 = \frac{-500}{b^2}$

$-b^2 = -500$

$b^2 = 500$

$b = \pm\sqrt{500}$

$\sqrt{500} + \frac{500}{\sqrt{500}} = 2\sqrt{500}$

44.72

$b > 0$ $\qquad \frac{50^\circ}{b} > 0$

0.000001

50 0,000,000

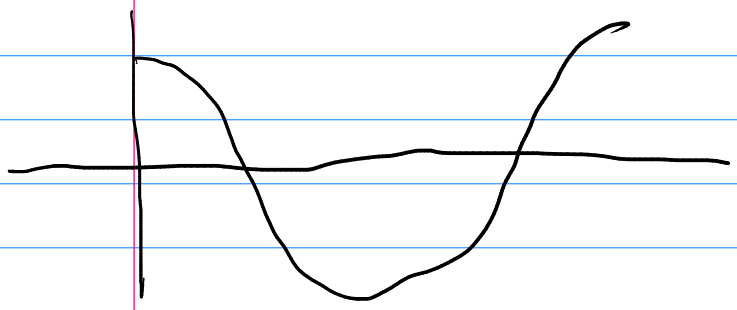
unbounded

$\lim_{x \to \pi} \frac{\sin x}{x - \pi}$ $\qquad \frac{\sin \pi}{\pi - \pi}$ $\qquad \frac{0}{0}$

$\frac{\cos x}{1 + 0}$ $\qquad \frac{-1}{1}$ $\qquad -1$

$$\lim_{x \to 0} \frac{\sin(2x)}{\sin(3x)} \qquad \frac{\sin 0}{\sin 0} \quad \frac{0}{0}$$

$$\frac{2\cos(2x)}{3\cos(3x)} \qquad \frac{2 \cdot 1}{3 \cdot 1} \qquad \frac{2}{3}$$



$$\frac{d}{dx}\sqrt{x} \qquad x^{\frac{1}{2}} \qquad \frac{1}{2}x^{\left(\frac{1}{2}-1\right)}$$

$$\frac{1}{2}x^{\left(-\frac{1}{2}\right)}$$

$$\frac{1}{2} \cdot \frac{1}{x^{\frac{1}{2}}} = \frac{1}{2} \cdot \frac{1}{\sqrt{x}}$$

$$= \frac{1}{2\sqrt{x}} \qquad \frac{\sqrt{x}}{2x}$$

$f'(x) = 2x$

$f(x)?$ $\quad x^2$

$x^2 + 5 \quad x^2 - 71$

$x^1 \rightarrow x^{1+1}$

$\frac{1}{2} 2x^2 = x^2$

$$\int 2x \, dx = x^2 + C$$

$$\int x^2 \, dx$$

$\frac{1}{3} x^3 + C$

$\frac{3}{3} x^2$

x^2

$$\int \sin x \, dx = -\cos x + C$$

$- -\sin x$

$\sin x$

$\int 5\,dx \qquad 5x + C$

$5x^0 \qquad \frac{5}{1}x^1$

$\int 0\,dx$

$0x + C$

C

$\int 3x^2 + 4x + 5 \; dx$

$\frac{3}{3}x^3 \qquad \frac{4}{2}x^2 \qquad 5x$

$x^3 + 2x^2 + 5x + C$

$a = -10 \frac{m}{s^2}$

$v(t) = -10t + C$

$-10(3) + C = -4$

$-30 + C = -4$

$C = 26$

$v(t) = -10t + 26$

$s(t) = \frac{-10}{2}t^2 + 26t + C$

$-5t^2 + 26t + C$

$-5(3)^2 + 26(3) + C = 0$

$-45 + 78 + C = 0$

@ time $t = 3$

$v_3 = -4 \frac{m}{s}$

$s_3 = 0$

$\int -10\,dt$

$-5t^2 + 26t - 33 = 0$

$C = -33$

$a = -10 \frac{m}{s^2}$

time 0 $s = 6$

time 1 $v = 8$

$v(t) = -10t + C$

$s(0) = 6$

$v(1) = 8$

$-10(1) + C = 8$

$-10 + C = 8$

$C = 18$

$v(t) = -10t + 18$

$-\frac{10}{2}t^2$

$s(t) = -5t^2 + 18t + C$ $\quad s(0) = 6$

$C = 6$

$s(t) = -5t^2 + 18t + 6$