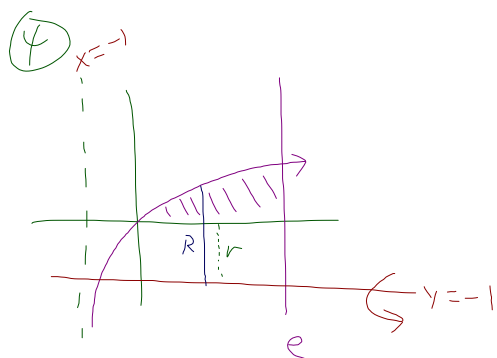


$$(2) \quad f(x) = \int_0^x \sin(t^2) dt$$

$$[1, 3]$$

Avg. Rate or Mean Value

$$\frac{\int_1^3 \sin(t^2) dt}{3 - 1}$$



$$\pi \int_0^e ((y+1)^2 - 1^2) dx$$

$$\pi \int_0^e [(\ln x + 1) + 1]^2 - 1^2 dx$$

$$(3) \int \frac{1}{\sqrt{x}(1-\sqrt{x})} dx$$

$$u = 1 - \sqrt{x}$$

$$du = -\frac{1}{2\sqrt{x}} dx \quad -2du = \frac{1}{\sqrt{x}} dx$$

$$-2 \int \frac{1}{u} du$$

$$-2 \ln u + C$$

$$-2 \ln(1 - \sqrt{x}) + C$$

$$(5) \quad \lim_{h \rightarrow 0} \frac{\int_1^{1+h} \sqrt{x^3+8} dx}{h}$$

$f(x) \quad f'(x)$

$$\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$$

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

$$f'(x) = \sqrt{x^3+8}$$

$$f'(1) = 3$$

$$(6) \quad h(x) = g(x^2)$$

$$h'(x) = g'(x^2) \cdot 2x$$

$$h'(2) = g'(4) \cdot (4)$$

$$(7) \quad \int_0^{\infty} x e^{-x^2} dx$$

$$u = -x^2$$

$$du = -2x dx$$

$$-\frac{1}{2} du = x dx$$

$$-\frac{1}{2} \int_0^{\infty} e^u du$$

$$\int e^u = e^u$$

$$\lim_{b \rightarrow \infty} \left[-\frac{1}{2} e^{-x^2} \right]_0^b$$

$$\lim_{b \rightarrow \infty} \left[-\frac{1}{2} e^{-b^2} - \left(-\frac{1}{2} e^{-0^2} \right) \right]$$

$$0 + \left(\frac{1}{2} \right)$$

$$(9) \quad x = e^t \quad y = 2e^{-t}$$

$$t = \ln 2$$

$$\text{slope} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{-2e^{-t}}{e^t} = -\frac{2}{e^{2t}}$$

$$y - 2e^{-t} = -\frac{2}{e^{2t}}(x - e^t)$$

10)

$$\frac{d}{dx} \rightarrow 2x - 2y \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{x}{y}$$

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

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

$$= \frac{y^2 - x^2}{y^3}$$

$x^2 - y^2 = 0$
 $x^2 = y^2$
 $x = y$

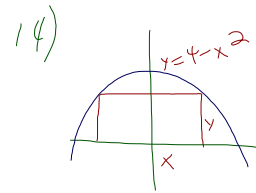
$$= \frac{-25}{y^3}$$

$$11) \sum \frac{1}{n^2} \text{ Conv.}$$

$$\sum \left(-\frac{1}{n}\right)^n \text{ Conv.}$$

$$\sum \frac{2^n}{n^2} = \infty \text{ Div.}$$

Nom grows faster



$$A = 2x \cdot y$$

$$A = 2x \cdot (4 - x^2)$$

$$A = 8x - 2x^3$$

$$A' = 8 - 6x^2$$

$$8 - 6x^2 = 0$$

$$8 = 6x^2$$

$$\sqrt{\frac{4}{3}} = x \quad \frac{+}{-} A'$$

$$A = 8\left(\sqrt{\frac{4}{3}}\right) - 2\left(\sqrt{\frac{4}{3}}\right)^3$$