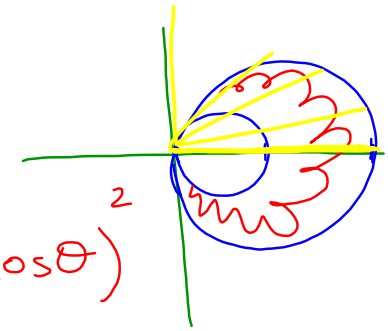
1997 (yellow)

21.



$$\frac{1}{2}\int_0^{\frac{\pi}{2}} (2\cos\theta)^2 - (\cos\theta)^2$$

$2\cos\theta = \cos\theta$ $\quad 2x = x$

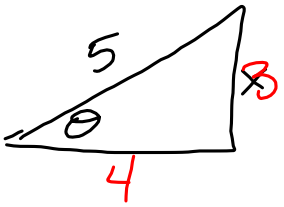
$\cos\theta = 0$

$\frac{\pi}{2}, \frac{3\pi}{2}$

$$\int 4\cos^2\theta - \cos^2\theta \, d\theta$$

$$\int_0^{\frac{\pi}{2}} 3\cos^2\theta \, d\theta$$

23.



$\frac{d\theta}{dt} = 3 \frac{\text{radians}}{\text{minute}}$

$\sin\theta = \frac{x}{5}$

$\frac{dx}{dt}$

$x = 3$

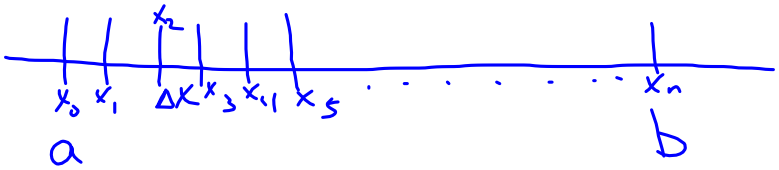
$\cos\theta \cdot \frac{d\theta}{dt} = \frac{1}{5}\frac{dx}{dt}$

$\frac{4}{5}(3) = \frac{1}{5}\frac{dx}{dt}$

25.

$$\lim_{n\to\infty} \sum_{i=1}^{n} \sqrt{x_i}\,\Delta x = \int_a^b \sqrt{x}\,dx$$

$\sqrt{x}$



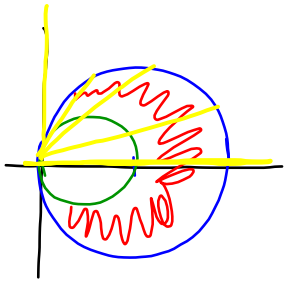
$$\frac{2}{3}x^{\frac{3}{2}}$$

21.

$$2\cos\theta = \cos\theta$$

$$\cos\theta = 0$$

$$-\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}$$

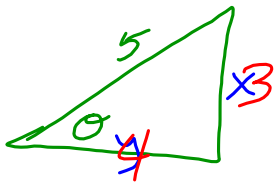


$$2\left(\frac{1}{2}\int_0^{\frac{\pi}{2}} (2\cos\theta)^2 - (\cos\theta)^2\,d\theta\right)$$

$$4\cos^2\theta - \cos^2\theta$$

$$2\left(\frac{1}{2}\int_0^{\frac{\pi}{2}} 3\cos^2\theta\,d\theta\right)$$

23.



$\frac{d\theta}{dt} = \frac{3 \text{ radians}}{\text{minute}}$

$x = 3$

$\sin\theta = \frac{x}{5}$

$\frac{dx}{dt} =$

$\cos\theta \cdot \frac{d\theta}{dt} = \frac{1}{5}\frac{dx}{dt}$

$\frac{4}{5} \cdot 3 = \frac{1}{5}\frac{dx}{dt}$

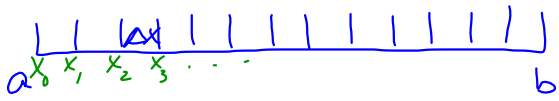
24.

$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots$

$\int f'(x) = \int x^2 - \frac{x^6}{3!} + \frac{x^{10}}{5!} - \cdots$

$f(x) = \frac{x^3}{3} - \frac{x^7}{3!\cdot 7}$

25.



$$\lim_{n\to\infty} \sum_{i=1}^{n} \sqrt{x_i}\,\Delta x$$

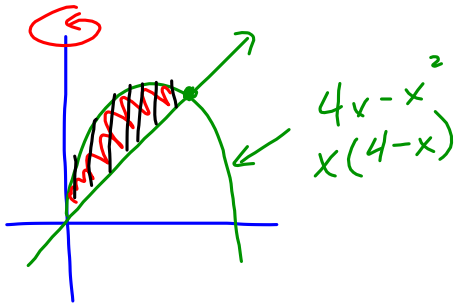
$$\int_a^b \sqrt{x}\,dx$$

$$\int_a^b x^{\frac{1}{2}}\,dx$$

$$\frac{2}{3}x^{\frac{3}{2}}\Big|_a^b$$

76.	D	84.	C
77.	E	85.	D
78.	A	86.	A
79.	D	87.	B
80.	B	88.	C
81.	D	89.	D
82.	B	90.	B
83.	E		

77.



$$2\pi \int r\, h$$

$$2\pi \int_0 x\left((4x-x^2)-(x)\right) dx$$

78.

$$\lim_{h\to 0} \frac{\ln(e+h)-1}{h}$$

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

$f'(e)$ $f(x) = \ln x$

80. $f(x) = \cos 2x + \ln(3x)$

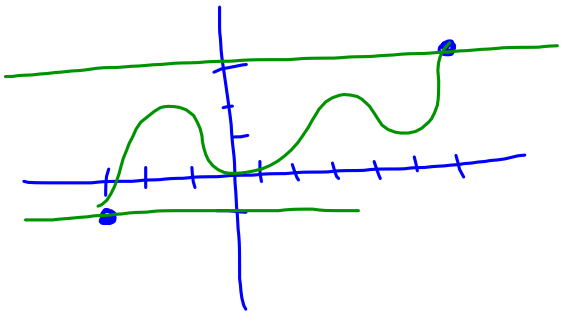
$f'(x) = -2\sin 2x + \frac{1}{3x} \cdot 3$

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

$f''(x) = -4\cos 2x - \frac{1}{x^2} = 0$

81. $(-3, -1)$

$(6, 3)$



82. $\int_0^x (t^2-2t)\,dt \geq \int_2^x t\,dt$

$\frac{t^3}{3} - t^2 \Big|_0^x \geq \frac{t^2}{2} \Big|_2^x$

$\frac{x^3}{3} - x^2 - (0) \geq \frac{x^2}{2} - 2$

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

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

$\frac{x^3}{3} - \frac{3}{2}x^2 + 2 \geq 0$

83. $\frac{dy}{dx} = (1+\ln x)y \qquad (1,1)$

$\int \frac{dy}{y} = \int (1+\ln x)\,dx \qquad \int \ln x$

$u = \ln x \quad dv = 1dx$

$du = \frac{1}{x}dx \quad v = x$

$\ln y = x + x\ln x - x + C$

$\ln y = x\ln x + C$

$y = e^{x\ln x + C}$

$y = Ce^{x\ln x}$

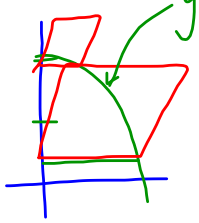
$1 = Ce^{1\ln 1}$

$1 = C$

$y = e^{x\ln x}$

85 $(1,2)$
$(3,7)$

87.



$$\int S^2$$

$$\int (\sqrt{2-y})^2 \, dy$$

$$\int_0^2 2-y \, dy$$

88. $f(\sqrt{\pi}) = \int_0^{\sqrt{\pi}^2} \sin t \, dt = -\cos t \Big|_0^{\pi}$

$-(-1) - (-1) = 2$

instantaneous

$\sin x^2 \cdot 2x = \frac{2-0}{\sqrt{\pi}-0}$

$2x \sin x^2 = \frac{2}{\sqrt{\pi}}$

89.

$f = 0 + \int_1^4 \frac{x^2}{1+x^5} \, dx$

90.

$$f = kx$$

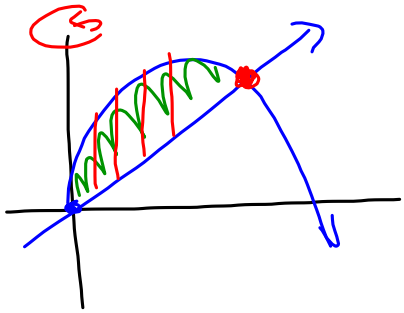
$$10 = k(4)$$

$$k = \frac{5}{2}$$

$$W = \int_0^6 \frac{5}{2} x \, dx$$

77.

$y = x \quad y = 4x - x^2 \quad x(4-x)$



$$2\pi \int r h$$

$$2\pi \int_0^3 x\left(4x - x^2 - x\right) dx$$

78.

$$\lim_{h\to 0} \frac{\ln(e+h) - 1}{h} = f'(e)$$

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

$$f(x) = \ln x$$

$$\frac{\ln(e+h) - \ln e}{h}$$

82.

$$\int_0^x (t^2 - 2t)\,dt > \int_2^x t\,dt$$

$$\frac{t^3}{3} - t^2 \Big|_0^x > \frac{t^2}{2} \Big|_2^x$$

$$\frac{x^3}{3} - x^2 - (0) > \frac{x^2}{2} - 2$$

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

$$-\frac{1}{2}x^2 \qquad -\frac{1}{2}x^2$$

$$\frac{x^3}{3} - \frac{3}{2}x^2 + 2 > 0$$

83. $\frac{dy}{dx} = (1+\ln x)\,y \qquad (1,1)$

$\int \frac{dy}{y} = \int (1+\ln x)\,dx$ $\int \ln x\,dx$ $u = \ln x$ $dv = 1$

$\ln|y| = x + x\ln x - x + C$

$y = e^{x\ln x + C}$

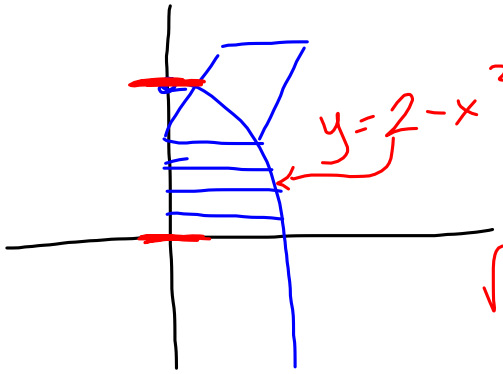
$y = Ce^{x\ln x}$

$1 = Ce^{1(0)}$ $y = e^{x\ln x}$

85. $(1,2)$

$(3,7)$

87.



$y-2=-x^2$

$\sqrt{2-y}=x^2$

$x=\sqrt{2-y}$

$$\int_0^2 \left(\sqrt{2-y}\right)^2 dy$$

88.

$$f(x)=\int_0^{x^2} \sin t\, dt$$

$$f(\sqrt{\pi})=\int_0^{\pi} \sin t\, dt = -\cos t \Big|_0^{\pi}$$

$$-(-1)-(-1)$$

avg.

$$\frac{2-0}{\sqrt{\pi}-0}$$

instantaneous

$$\sin x^2 (2x)$$

$$\frac{2}{\sqrt{\pi}} = 2x \sin x^2$$

89.

$$f(4) = 0 + \int_1^4 \frac{x^2}{1+x^5}\,dx$$

90.

$$F = kx$$

$$10 = k(4)$$

$$k = \frac{5}{2}$$

$$W = \int_0^6 \frac{5}{2}x\,dx$$