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

$$F(1)=\frac{1-3}{(1-2)^2}=\frac{-2}{1}\ \boxed{-2}\qquad F(2)=\frac{2-3}{(2-2)^2}=\frac{-1}{0}$$

$$(1-2)(1-2)=1-2-2+4=1\qquad f'(3)=\lim_{h\to 0}\frac{\frac{1}{3+h}-\frac{1}{3}}{h}$$

$$F(3)=\lim_{h\to 0}\frac{f(3+h)-f(3)}{h}$$

$$F(3+h)=\frac{1}{3+h}\ \text{and}\ F(3)=\frac{1}{3}$$

$$F(1)=1^2+1=2$$

$$f'(1)=\cancel{2\cdot 1+1=3}$$

$$F'(3)=2(3)+1=6+1=7$$

$$F(3)=3^2+3=12$$

$$F(x)=\frac{\tan(x)}{\ln(x)}\qquad g(3)=1$$

$$F'(x)=\frac{\sec^2(x)\cdot\ln(x)-\frac{\tan(x)}{x}}{[\ln(x)]^2}\qquad h'(3)=f'(3)g(3)+F(3)g'(3)$$

$$=(7)(1)+(12)(-1)=-5$$

$$F(x)=\arctan(3x)\qquad L(2)=2^2+3=4+3=7$$

$$\frac{d}{du}\arctan(u)=\frac{1}{1+u^2}$$

$$F'(x)=2x$$

$$=\frac{1}{1+(3x)^2}\cdot 3\qquad F'(2)=2(2)=4\Rightarrow L(x)=7+4(x-2)$$

$$=L(x)=4(x-2)+7$$

$$=\frac{3}{1+9x^2}$$

$$f'(x)=\frac{x-4}{3(x-6)^{1/3}}=0\qquad f''(x)=\frac{2\overset{4}{x}-14}{9(\underset{4}{x}-6)^{4/3}}=\frac{8-14}{9(-2)^{4/3}}=\frac{-6}{9\cdot 16^{1/3}}$$

$$x-4=0\rightarrow x=4$$

$$\int x\sqrt[3]{x^2+1}\,dx\qquad du=2x\,dx\ \text{or}\ \frac{1}{2}du=x\,dx\qquad \int_0^{\frac{\ln(7)}{2}}e^{2x}dx$$

$$=\int\sqrt[3]{u}\cdot\frac{1}{2}du=\frac{1}{2}\int u^{1/3}du\qquad \int e^{2x}dx=\frac{1}{2}e^{2x}+C$$

$$\frac{1}{2}\cdot\frac{3}{4}u^{4/3}+C=\frac{3}{8}(\cancel{x}^2+1)^{4/3}+C\qquad e^{2\ln}$$

Question 13:

(a) $\boxed{A = \pi r^2}$

(b) $\frac{dA}{dt} = \frac{d}{dt}(\pi r^2)$

$\frac{dA}{dt} = \boxed{2\pi r \frac{dr}{dt}}$

(c) $\frac{dA}{dt} = 2\pi(20)(2) = 80\pi$ sq ft

square feet per second

or

Ft/sec

Question 14: $f(x) = x^2 - 6$ $\quad g(x) = 12 - x^2$

(a) $x^2 - 6 = 12 - x^2$ ($+x^2$ $+6$)

$\rightarrow x^2 + x^2 = 12 + 6$

$\rightarrow \frac{2x^2}{2} = \frac{18}{2}$

$\rightarrow \sqrt{x^2} = \sqrt{9}$

$\rightarrow x = \pm 3$

$\boxed{\text{g(x) and f(x) intersect at } x=3 \quad x=-3}$

(b) $g(x) \rightarrow$ upper $\quad f(x) \rightarrow$ Lower

$\text{Area} = \int_{-3}^{3} [(12-x^2) - (x^2-6)]\,dx$

$\rightarrow A = \boxed{\int_{-3}^{3} (18 - 2x^2)\,dx}$

Question 15: