Ex # 7.1

(13 - 18) find $f^{-1}(x)$

(13) $f(x) = x^2+1$

Let $y = x^2+1$

$y-1 = x^2$

$\Rightarrow x^2 = y-1$

$\Rightarrow x = \pm\sqrt{y-1}$

Ignore -ve Sign

$x = +\sqrt{y-1}$

replace x with y and y with x

$y = \sqrt{x-1}$

So $\boxed{f^{-1}(x) = \sqrt{x-1}}$ Answer

Checking

$ff^{-1}(x) = x = f^{-1}f(x)$

So

L.H.S $ff^{-1}(x) = f(\sqrt{x-1})$

$\because f(x) = x^2+1$

$= (\sqrt{x-1})^2 + 1$

$= x - \cancel{1} + \cancel{1}$

$= x =$ R.H.S

Similarly

$f^{-1}f(x) = x$

(17) $f(x) = (x+1)^2$, $f^{-1}(x) = ?$

Let $y = (x+1)^2$

$\Rightarrow \sqrt{y} = x+1$

$\Rightarrow \sqrt{y} - 1 = x$

$\Rightarrow x = \sqrt{y} - 1$

replace x with y and y with x

$y = \sqrt{x} - 1$

So $\boxed{f^{-1}(x) = \sqrt{x} - 1}$ Ans

Checking

$ff^{-1}(x) = x = f^{-1}f(x)$

L.H.S

$ff^{-1}(x) = f(\sqrt{x} - 1)$

$\because f(x) = (x+1)^2$

$= (\sqrt{x} \cancel{-1} \cancel{+1})^2$

$= (\sqrt{x})^2$

$ff^{-1}(x) = x =$ R.H.S

Similarly

$f^{-1}f(x) = x$

$\boxed{14, 15, 16, 18}$

Homework

Ex # 7.2

Q 5-36

(19) $y = \frac{\ln t}{t}$

Find $\frac{dy}{dt}$

$$\frac{dy}{dt} = \frac{t\frac{d}{dt}(\ln t) - (\ln t)\frac{d}{dt}(t)}{t^2}$$

$$= \frac{\cancel{t}\cdot\frac{1}{\cancel{t}} - (\ln t)(1)}{t^2}$$

$$\frac{dy}{dt} = \frac{1 - \ln t}{t^2}$$ Ans

(44) $\int_2^4 \frac{dx}{x\ln x}$

$$= \int_2^4 \frac{1}{\ln x}\left(\frac{1}{x}dx\right)$$

$\int \frac{1}{\ln x}dx = \ln(x)$

$$= \ln(\ln x)\Big|_2^4$$

$$= \ln(\ln 4) - \ln(\ln 2)$$

Ans

(24) $y = \ln(\ln(\ln x))$

Find $\frac{dy}{dx} = ?$

$$\frac{dy}{dx} = \frac{d}{dx}\left(\ln(\ln(\ln x))\right)$$

$$= \frac{1}{\ln(\ln x)}\frac{d}{dx}\left(\ln(\ln x)\right)$$

$$= \frac{1}{\ln(\ln x)}\left(\frac{1}{\ln x}\right)\frac{d}{dx}(\ln x)$$

$$= \frac{1}{[\ln(\ln x)][\ln x]}\left(\frac{1}{x}\right)$$

$$= \frac{1}{x[\ln(\ln x)][\ln x]}$$

Ans

$$\int \frac{1}{(x)}dx = \ln x + c$$

(48)

(4

34, 32, 22, 29, 30

$\theta + \sec y \tan y$

(48) $\displaystyle\int \frac{\sec y \tan y}{(2+\sec y)'} dy$ $\quad \because \displaystyle\int \frac{1}{x} dx = \ln x$

$= \ln(2 + \sec y) + C$ Ans

(42) $\displaystyle\int_0^{\pi/3} \frac{4\sin\theta}{(1-4\cos\theta)'} d\theta$ $\quad \dfrac{0 - 4(-\sin\theta)}{4\sin\theta}$

$= \displaystyle\int_0^{\pi/3} \frac{4\sin\theta}{1-4\cos\theta} d\theta$

$= \displaystyle\int_0^{\pi/3} \frac{4\sin\theta}{1-4\cos\theta} d\theta$ $\quad \because \displaystyle\int \frac{1}{x} dx = \ln x$

$= \ln(1-4\cos\theta) \Big|_0^{\pi/3}$

$= \ln(1-4\cos\pi/3) - \ln(1-4\cos(0))$ $\quad 1$

$=$ Ans

50) $\displaystyle\int_{\pi/4}^{\pi/2} \cot t \, dt = \int_{\pi/4}^{\pi/2} \frac{\cos t}{(\sin t)'} dt$

$= \ln(\sin t) \Big|_{\pi/4}^{\pi/2}$ $\quad \because \displaystyle\int \frac{1}{x} dx = \ln x$

$= \ln(\sin \pi/2) - \ln(\sin \pi/4)$ A

$\boxed{40, 43, 47, 49, 51}$

$$\frac{d}{dx}\left(e^{ax}\right) = e^{ax}\frac{d}{dx}(ax)$$

$$= e^{ax} \cdot a = ae^{ax}$$

question

Find $\frac{d}{dx}\left(e^{2x+9}\right)$

$$= e^{2x+9}\frac{d}{dx}(2x+9)$$

$$= e^{2x+9}\left(2(1)+0\right)$$

$$= e^{2x+9} \cdot 2 \qquad = 2e^{2x+9} \text{ Ans}$$

$$\int e^{ax}\,dx = \frac{e^{ax}}{a} + C$$

question solve $\int e^{2x+9}\,dx$

$$= \frac{e^{2x+9}}{2(1)+0} + C$$

$$= \frac{e^{2x+9}}{2} + C \quad \text{Ans}$$