1. $y = x^2 + 2x$

Now

$y = x^2 + 2x$

$d(y) = d(x^2 + 2x)$

$dy = 2xdx + 2dy$

Put the value of x and dx

$dy = 2(2)(-0.2) + 2(-0.2)$

$dy = -1.2$

Now

$y + \delta y = (x + \delta x)^2 + 2(x + \delta x)$

$\delta y = (x + \delta x)^2 + 2x + 2\delta x - y$

Put the value of y

$\delta y = (x + \delta x)^2 + 2x + 2\delta x - (x^2 + 2x)$

$\delta y = (x + \delta x)^2 + 2x + 2\delta x - x^2 - 2x$

$\delta y = (x + \delta x)^2 + 2\delta x - x^2$

$x = 2$

$\delta y = (2 - 0.2)^2 + 2(-0.2) - (2)^2$

$\delta y = -1.16$

2. $= \int (\sqrt{x} - \frac{1}{\sqrt{x}}) dx$

$= \int \sqrt{x} dx + \int \frac{1}{\sqrt{x}} dx$

$= \int x^{1/2} dx + \int x^{-1/2} dx$

$= \frac{x^{\frac{1}{2}+1}}{\frac{1}{2}+1} + \frac{x^{-\frac{1}{2}+1}}{-\frac{1}{2}+1} + c$

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

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

3. $= \int (2x+3)^{1/2} dx$

$\times$ and $\div$ by 2 to make a derivative

$= \frac{1}{2} \int (2x+3)^{1/2} . 2dx$

$= \frac{1}{2} . \frac{(2x+3)^{1/2+1}}{1/2+1} + c$

$= \frac{1}{2} . \frac{(2x+3)^{3/2}}{3/2} + c$

$= \frac{1}{2} . \frac{2}{3} (2x+3)^{3/2} + c$

$= \frac{1}{3} (2x+3)^{3/2} + c$

4. $xy + x = 4$

Taking differentials on both sides

$d(xy+x) = d(4)$

$xdy + ydx + dx = 0$

$xdy + (y+1)dx = 0$

$xdy = -(y+1)dx$

$\frac{dy}{dx} = -\frac{y+1}{x}$ and $\frac{dx}{dy} = -\frac{x}{y+1}$

I am Sorry !!!!!

5. $= \int \frac{e^{2x}+e^x}{e^x} dx$

$= \int \left[\frac{e^{2x}}{e^x} + \frac{e^x}{e^x}\right] dx$

$= \int [e^x + 1] dx$

$= \int e^x dx + \int 1 dx$

$= \frac{e^x}{1} + x + c$

$= e^x + x + c$

6. $= \int tan^2 x dx$

$= \int (sec^2 x - 1) dx$

$\therefore 1 + tan^2\theta = sec^2\theta$

$= \int sec^2 x dx - \int 1\, dx$

$= tanx - x + c$

7. Let $y = \sqrt[4]{x} = x^{1/4}$

we take $x = 16$

$\delta x = dx = 17 - 16 = 1$

$y = (16)^{1/4} = 2$

Now $y = x^{1/4}$

$d(y) = d(x^{1/4})$

$d(y) = \frac{1}{4} x^{\frac{1}{4}-1} dx$

$d(y) = \frac{1}{4} x^{-\frac{3}{4}} dx$

Put $x = 16, dx = 1$

$dy = \frac{1}{4}(16)^{-\frac{3}{4}}(1) = \frac{1}{4}(2)^{-3}$

$dy = \frac{1}{4} . \frac{1}{8} = \frac{1}{32} = 0.03125$

Thus $\sqrt[4]{17} \approx y + dy$

$\sqrt[4]{17} = 2 + 0.03125$

$\sqrt[4]{17} = 2.03125$

8. $y = x^2 - 1$ As x changes from 3 to 3.02, so

$y = x^2 - 1$

$d(y) = d(x^2 - 1)$

$dy = 2xdx - 0 = 2xdx$

Put the value of x and dx

$dy = 2(3)(0.02) = 0.12$

Now

$y + \delta y = (x + \delta x)^2 - 1$

$\delta y = (x + \delta x)^2 - 1 - y$

Put value of y

$\delta y = (x + \delta x)^2 - 1 - (x^2 - 1)$

$\delta y = (x + \delta x)^2 - 1 - x^2 + 1$

$\delta y = (x + \delta x)^2 - 1 - x^2$

$x = 3$

$\delta x = dx = 3.02 - 3 = 0.02$

Put the value of c and δx

$\delta y = (3 + 0.02)^2 - (3)^2$

$\delta y = 0.1204$

