i) $y = 3x^2 + 2x + 4$

$a=3$, $b=2$, $c=4$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{2^2-4\times3\times2}}{2\times3}$$

$$= \frac{-2 \pm \sqrt{4-24}}{6}$$

$$= \frac{-2 \pm \sqrt{-20}}{6}$$

N.P.

∴ no solutions

d) $4(2x-6)(x+16)=0$

$2x-6=0$ or $x+16=0$

$2x=6$ $\quad x=-16$

$x=3$

h) $3x^2+2x+4=10$

$3x^2+2x-6=0$

$a=3$, $b=2$, $c=-6$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{2^2-4\times3\times-6}}{2\times3}$$

$$= \frac{-2 \pm \sqrt{4+72}}{6}$$

$$= \frac{-2 \pm \sqrt{76}}{6}$$

$$= \frac{-2 \pm 2\sqrt{19}}{6}$$

$$= \frac{-1 \pm \sqrt{19}}{3} \quad \div \text{ everything by } 3$$

$$= \frac{-1+\sqrt{19}}{3} \text{ or } \frac{-1-\sqrt{19}}{3}$$

2. a) $y = 3x - 8$

$\therefore y' = 3$

b) $y = -7x^2 - 14$

$\therefore y' = -14x$

c) $y = (x+2)(x+1)$

$u = x+2$ $\quad v = x+1$

$u' = 1$ $\quad v' = 1$

$y' = (x+2)\times1 + 1\times(x+1)$

$= x+2+x+1$

$= 2x+3$

d) $y = \frac{3}{x^2}$

$= 3x^{-2}$

$\therefore y' = -6x^{-3}$

e) $y = e^x + 3x^2$

$y' = e^x + 6x$

f) $y = x^2 \ln x$

$u = x^2$ $\quad v = \ln x$

$u' = 2x$ $\quad v' = \frac{1}{x}$

$\therefore y' = x^2 \times \frac{1}{x} + 2x \times \ln x$

$= \frac{x^2}{1} \times \frac{1}{x} + 2x \ln x$

$= \frac{x^2}{x} + 2x \ln x$

$= x + 2x \ln x$

3a) $\log_{10} 100 = 2$ as $10^2 = 100$

b) $\log_4 16 = 2$ as $4^2 = 16$

c) $\log_9 3 = \frac{1}{2}$ as $9^{\frac{1}{2}} = 3$

d) $\ln e^5 = 5$ as $\log_e e^5 = 5$