

**If you can solve the below math problems you are well prepared for the BIOS13 Modelling Biological Systems course. If not, and you still want to take the course, it is highly recommended to refresh your math before the course starts.**

1. Expand the following expressions:

a)  $3x(yz - y^2 + x^2)$                       b)  $(3c - d)(a + b)$

2. Simplify the following expressions:

a)  $\frac{4a + 8b}{a + 2b}$               b)  $a(b - c) - c(b - a)$               c)  $\frac{u^4v^7}{v^3u}$

d)  $x^8x^{-2}x^{-6}$

3. Solve the following equations :

a)  $4 + 3x = 13$                       b)  $\frac{x + 2}{x - 2} = 3$

4. Calculate the derivative of :

a)  $f(x) = 4 - 3x^2$               b)  $f(y) = \frac{5}{3y^2}$               c)  $f(w) = e^{4w}$

## Solutions

1. Expand the following expressions:

a)  $3x(yz - y^2 + x^2) = 3xyz - 3xy^2 + 3x^3$

b)  $(3c - d)(a + b) = 3ac + 3bc - ad - bd$

2. Simplify the following expressions:

a)  $\frac{4a + 8b}{a + 2b} = \frac{4(a + 2b)}{a + 2b} = 4$

b)  $a(b - c) - c(b - a) = ab - ac - bc + ac = ab - bc = b(a - c)$

c)  $\frac{u^4 v^7}{v^3 u} = u^{4-1} v^{7-3} = u^3 v^4$

d)  $x^8 x^{-2} x^{-6} = x^{8-2-6} = x^0 = 1$

3. Solve the following equations :

a)  $4 + 3x = 13 \Leftrightarrow 3x = 13 - 4 = 9 \Leftrightarrow x = \frac{9}{3} = 3$

b)  $\frac{x + 2}{x - 2} = 3 \Leftrightarrow x + 2 = 3(x - 2) = 3x - 6 \Leftrightarrow$

$2 + 6 = 3x - x = 2x \Leftrightarrow x = \frac{8}{2} = 4$

4. Calculate the derivative of :

a)  $f(x) = 4 - 3x^2 \Rightarrow f'(x) = 0 - 3 \cdot 2x^{2-1} = -6x$

b)  $f(y) = \frac{5}{3y^2} = \frac{5}{3}y^{-2} \Rightarrow f'(y) = \frac{5}{3}(-2)y^{-2-1} = -\frac{10}{3}y^{-3}$

c)  $f(w) = e^{4w} \Rightarrow f'(w) = e^{4w} \cdot 4 = 4e^{4w}$