

Engineering Maths Tutorial 15 (Elec)

1. A straight line goes through the points (1,6) and (3,-2). Set up and solve a system of equations to find the equation of the line.
2. Solve the simultaneous equations problem

$$y = x - 12$$

$$y^2 + 2x = 27$$

3. Simplify $\frac{x^2-4}{x^3-7x^2+10x}$ and use your answer to solve $\frac{x^2-4}{x^3-7x^2+10x} = \frac{4}{3}$
4. Solve $4^{2p+3} = 32768$
5. Solve $2^{x+3}5^{x-2} = 320$
6. Find the equation of an exponential graph that goes through (0,4) and (2,12).
7. Solve the equation $-4 = 10 \sin(3x + 9^\circ)$, giving all solutions in the range $0^\circ \leq x \leq 120^\circ$
8. Solve the equation $x^4 - 3x^2 + 2 = 0$. (Hint: Let $u = x^2$. Then $x^4 = u^2$. Write the equation as a quadratic in u and solve it.)
9. Find the equation of the tangent to $y = x^3(1+x)^4$ at the point where $x = 1$
10. Find the equation of the tangent to $y = 4e^{6x-12}$ at the point where $x = 2$.
11. Find the maxima and minima of the curve $y = x^5 - 5x + 4$
12. Find the maxima and minima of $y = \frac{x^3}{3} - 4x^2 - 9x$.
13. Find the area between $y = \sin(x)$ and $y = \cos(x)$ between the ordinates $x = 0$ and $x = \frac{\pi}{4}$.
14. Find the mean value of $(2x + 4)^3$ between $x = -2$ and $x = 6$.
15. An object is dropped from the top of the Sky Tower. The height of the object as a function of time is given by $s(t) = 328 - 4.9t^2$.
 - a) How high is the Sky Tower?
 - b) How high is the object after 3 seconds?
 - c) How long does it take the object to land?
 - d) Find an expression for the velocity of the object
 - e) How fast is it falling after 3 s?
 - f) What is the acceleration of the object?
16. Ask about any maths questions you have encountered this semester that you're unsure of. (Could be in lectures, tests, quizzes or worksheets).