

All questions should be submitted by 4pm on Friday May 6th. Assignments can be submitted at your tutorial, or to the MATH1040/7040 assignment boxes (4th floor Priestley Building #67). **Make sure that your name, student number, tutorial group and your tutor's name are on each sheet of your answers.** You do not need a cover sheet nor do you need to include the question sheet. Solutions will be distributed in class later.

- Answer each of the following questions, showing all working.
 - Solve $-24 + 2y^2 = 2y$.
 - Solve $-3z(2z - 3) = 0$.
 - Given the quadratic equation $y = -4x^2 + 32x + 36$:
 - Find the roots of y .
 - Find the y -intercept of the quadratic.
 - Sketch the graph of the quadratic.
- Peter the Mathematician is invited to attend the First International Congress of Mathematical Shoemaking to be held in Hawaii in 21 months' time. The problem is that Peter would be required to wear shoes but currently he doesn't have any. Clever Peter has a bank account earning 10.0% p.a., compounding quarterly. How much money does he need to invest now in order to buy a pair of shoes and go to Hawaii, assuming the price of a pair of decent shoes is \$400? Ignore fees and taxes, and round your answer appropriately.
- Peter needs to pay a bill of \$200 in 13 years' time. His bank account earns 2.0 percent interest each year, compounding continuously. How much money does he need to invest now in order to exactly cover his bill in 13 years? Ignore fees and taxes, and round your answer to cents.
- Without using a calculator, find each of:
 - $\log_4 4^{-18}$
 - $\log_4 4$
 - $\log_4 \frac{1}{64}$
 - $\log_{10} 100000$
 - $\log_{10} \frac{1}{10000}$
 - $\ln e^{-5}$
 - $\ln \frac{1}{e^{13}}$
 - $\log_{25} 5$
- "Hop hop hippity hop" went the Easter Bunny, delivering yummy chocolatey treats to all the good little girls and boys. But when he reached Damien's house, the Easter Bunny stopped, at the point $(0, 0)$. He could see the easter nest at the point $(4, 0)$, but someone had erected an electrified rabbit-proof fence between the bunny and the nest. The top of the fence is just below the point $(2, 8)$.
 - Everyone knows that bunnies hop in parabolas, so the equation of their hop is a quadratic. To reach the nest, the bunny will have to hop from the point $(0, 0)$ to the point $(4, 0)$, passing through the point $(2, 8)$. Draw a rough diagram showing the three points, and the path the bunny must follow to reach the nest.
 - You know that the equation of the bunny's path is $y = ax^2 + bx + c$. By substituting the x and y values of each of the three points into the general form of the equation of a quadratic, derive three equations involving a , b and c .
 - Solve the three equations from Part (b), thus giving the equation the bunny must hop.

(continued over...)

- (d) Damien doesn't like rabbits (he was attacked by one when he was a baby). He is hiding with his Kalashnikov Assault Rifle, at the point $(4.5, 0)$. His weapon is pointing with a gradient of $m = -4$, and he is waiting for that bunny. Find the equation his bullets will follow (assume it is a straight line).
- (e) Find the point(s) at which the bullets' path will intersect the hop of the easter bunny. (Hint: at the points of intersection, the y values of the bunny equation and the bullet equation are equal. Equate the two expressions, thus giving a new quadratic equation. Solve the new equation.)
6. There are eight equations given in this question and you need to match each equation with its corresponding graph. The graphs are shown in Figure 1.
- (a) $-x - 14 = x - 15$ (b) $5y + 4x^2 = -10y - 12x^2$ (c) $-5y + 9x + 15 = -11y - 9x + 15$
 (d) $y = e^{7x}$ (e) $y = 10 \times |10x|$ (f) $y = -|15x|$
 (g) $14x^2 = -15y + 15x^2$ (h) $10y + 14 = 12y + 8x^2 + 16$

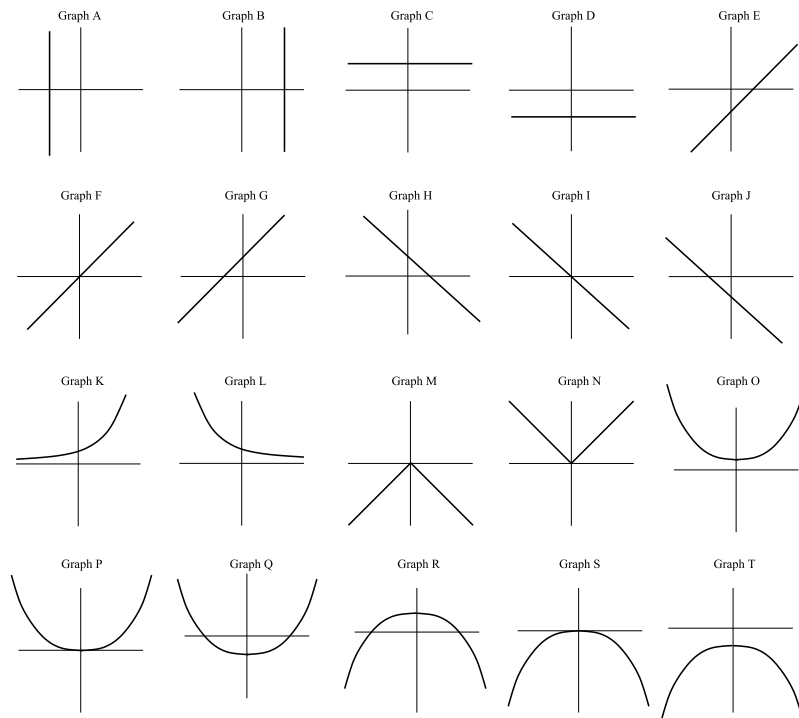


Figure 1: Graphs of various equations.