

Summer task for new year 13s.

1. Simplify each of the following expression:

a. $\frac{x^2-x-2}{x^2+x}$

b. $\frac{x}{x-1} - \frac{1}{x-1}$

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

2. Given that $\arctan x = 1.1$, find the value of x correct to 3 decimal places.

3. Given that $\cot x = 1.1$ and $-\pi \leq x \leq \pi$, find the value of x , correct to 2 decimal places.

4. Solve for $0 \leq \theta < 360$ the equation $7\tan^2\theta + \sec\theta = 1$, giving your answers to 2 decimal places.

5. Given that $\sin A = \frac{7}{25}$, where $0 < A < 90$, find the exact value of $\sin 2A$.

6. Solve for $-\pi \leq \theta < \pi$ the equation $\sin\theta + \cos\theta = 0$, giving exact answers.

7. Solve the equation $\cos 2\theta = \sin\theta$ for $0 \leq \theta \leq 2\pi$, giving your answers in terms of π .

8. Find the exact value of x for each of the following:

a. $e^{3x+1} = e^x$

b. $\ln(3x+1) = \ln(x)$

c. $e^{3x+1} = 2$,

d. $\ln(3x+1) = 2$

e. $5e^x - e^{2x} = 4$

f. $\ln x + \ln(x-5) = \ln 6$

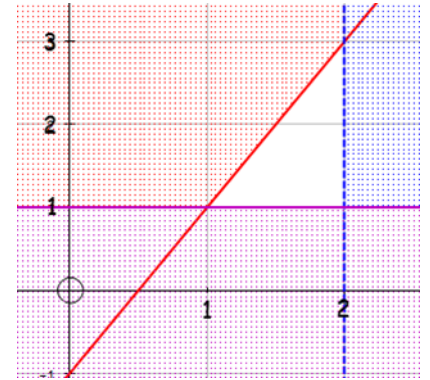
g. $3^x e^x = 4$

9. i. Sketch the following inequalities on the same diagram; $y > 2$, $x < 5$, $y < x$.

ii. If x and y have integer values what is the only pair of co-ordinates that satisfies the inequalities; $y > 2$, $x < 5$, $y < x$.

10. a. Identify the 3 inequalities in the diagram opposite.

b. Which pair of co-ordinate's with integer values satisfy these inequalities?



11. Differentiate each of the following:

a. e^{3x}

b. e^{-x+1}

c. e^{-x^3}

d. $e^{\sin x}$

e. $2e^{\ln x}$

f. $\frac{x}{e^x}$

g. $(1 + 2x)^3$

h. $\sqrt{1 - 2x}$

i. xe^x

j. $\frac{x^2}{x+1}$

k. $x^2(x - 1)^3$

l. $\frac{xe^{2x}}{x-1}$

12. Express each of the following as a single logarithm:

a. $\ln a - \ln b + \ln c$

b. $2\ln a - \ln b$

c. $\ln^3 \sqrt{a} + 2\ln b - \frac{1}{3}\ln c$

d. $1 - \ln a$

13. Integrate the following: a. $(1 + 5x)^4$ b. $\sqrt{1 + 2x}$

14. Find the length of the shortest route needed to traverse the each edge of the network at least once, starting and finishing at the same vertex.

