https://www.buymeacoffee.com/DrBennison

Show that $\int -\frac{1}{\sqrt{1-x^2}}\,\mathrm{d}x = \arccos(x) + C$ by using the substitution $x = \cos(u)$.

Prove that $x = n^3 - n$ is divisible by 12 for all odd integers $n > 2$.

Sketch $y = \frac{3}{x}$ and $y = \frac{4}{x^2}$ on the same graph and state the equation of the asymptotes.

The points A and B have coordinates $(1,6)$ and $(5,12)$ respectively. Find the vectors $\mathbf{u} = \overrightarrow{OA}$, $\mathbf{v} = \overrightarrow{OB}$ and $\mathbf{w} = \overrightarrow{AB}$ where O is the origin. M is the midpoint of AB, express $\overrightarrow{AM}$ in terms of $\mathbf{u}$, $\mathbf{v}$ and $\mathbf{w}$ and find the length $|AM|$.

Where does the tangent to $y = \sin(x)$ at the point where $x = \frac{\pi}{6}$ cross the coordinate axes.

Find the binomial expansion of $y = \frac{(2x+3)^{\frac{1}{2}}}{3+4x}$ and state the values of x for which this expansion converges.

An arithmetic series has second term 9 and eighth term 51. Find the sum of the first 20 terms.

Find the stationary points of $y = \frac{3x^2 + 7x + 3}{e^x}$

l_1 is a line with gradient 2 passing through the point $(5,2)$. C_1 is a circle, centre $(4,2)$ with radius 5. Find where l_1 and C_1 intersect.

Find the derivative of $y = x^3 + 3x^2$ from first principles.

Prove $\sec^2(x) + \operatorname{cosec}^2(x) = \sec^2(x)\operatorname{cosec}^2(x)$

$(x-2)$ and $(x+3)$ are both factors of $p(x) = x^4 + ax^3 + bx^2 - 15x + 18$. Find a and b and hence find all roots of $p(x)$.