AQA A-Level Mathematics Warmup - Paper 1 2022

Find, by substitution $\int \frac{\sec^2(x)}{\sqrt{\tan(x)}}\ \mathrm{d}x$	Find the distance between the points $A(3,5)$ and $B(5,1)$	$(x+2)$ is a factor of x^3+6x^2+bx+6. Find b.	Find the centre and radius of the circle $x^2-4x+y^2+6y+4=0$	What is the period of the sequence defined by $u_n = 2+(-1)^n$?
Show that $f(x) = \mathrm{e}^{\frac{x}{2}}\cos(x)$ has a root between $x=4$ and $x=6$.	Differentiate $y=\sin(3x^2+4x)$	Find $\frac{\mathrm{d}y}{\mathrm{d}x}$ for $3x^2y+y^2=5x^2+8x$.	State the Trapezium rule for approximating the integral $I=\int_a^b f(x)\ \mathrm{d}x$ with n strips.	Sketch $f(x)=(x+1)^2(x-1)(x-2)$ and its gradient function.
Express in Cartesian form the curve given parametrically by $x=t-1$ and $y=t^2+2$	State the three Pythagorean trigonometric identities.	The first three terms of a geometric series are $\sqrt{3}, \sqrt{15}$ and $5\sqrt{3}$. Why can you not find a sum to infinity for this series?	Find the area between the curve $y=-(x+1)(x-4)(x+3)$ and the $x-$axis.	Find the equation of the tangent to the curve $y = x\sin(x)$ at $x=\frac{\pi}{3}$
Sketch the graphs $y=\sin(x)$, $y=\sin(x)+2$ and $y=2\sin(x-\pi)$ on the same axes.	Find the small angle approximation for $\frac{\cos^2(x)\sin(x)}{\tan(x)}$	State the factor theorem.	Find the area of the sector of a circle of radius 4 cm where the angle subtended at the centre is $120°$.	State the Newton-Raphson method.

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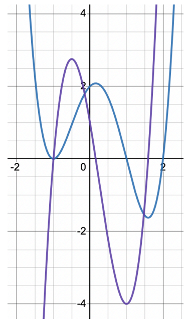
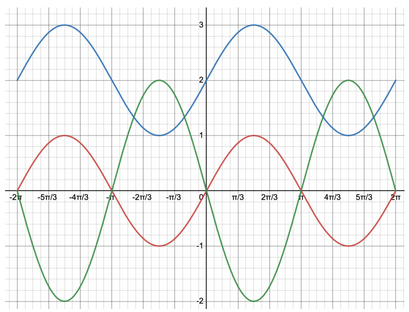
$2\sqrt{\tan(x)} + C$	$2\sqrt{5}$	$b = 11.$	By completing the square the centre is $(2, -3)$ and the radius is 3.	2
$f(4) \approx -4.83$ $f(6) \approx 19.29$ As there is a sign change and $f(x)$ is continuous, there is a root in the interval $[4,6]$.	$\frac{\mathrm{d}y}{\mathrm{d}x} = (6x+4)\cos\left(3x^2+4x\right)$	$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{-6xy+10x+8}{3x^2+2y}$	$I \approx \frac{h}{2}\left[y_0 + y_n + 2\left(y_1 + y_2 + \cdots + y_{n-1}\right)\right]$ where $h = \frac{b-a}{n}$	
$y = (x+1)^2 + 2$ $= x^2 + 2x + 3$	$\sin^2(x) + \cos^2(x) = 1$ $1 + \tan^2(x) = \sec^2(x)$ $\cot^2(x) + 1 = \mathrm{cosec}^2(x)$	$r = \sqrt{5} > 1$ and so the infinite series is not convergent.	$\frac{407}{4}$	$y = \left(\frac{\sqrt{3}}{2} + \frac{\pi}{6}\right)x - \frac{1}{3}\left(\frac{\sqrt{3}}{2} + \frac{\pi}{6}\right) + \frac{\pi}{2\sqrt{3}}$
	$\frac{x^4}{4} - x^2 + 1 \approx -x^2 + 1$	Let $f(x)$ be a polynomial such that $f(c) = 0$ for some constant c. Then $(x-c)$ is a factor of $f(x)$. Conversely if $(x-c)$ is a factor of $f(x)$ then $f(c) = 0$	**Don't forget to change the angle into radians!** $A = \frac{1}{2} \times 4^2 \times \frac{2\pi}{3}$ $= \frac{16\pi}{3}$	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$