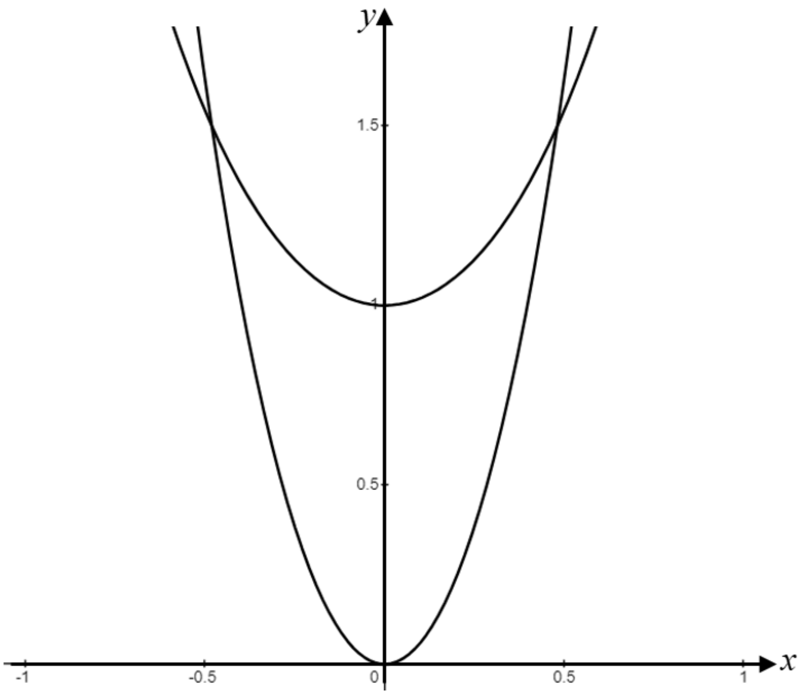
1(a)	$I_n = \left[x^n \cosh x\right]_0^1 - n\int_0^1 x^{n-1} \cosh x \, dx$
	$= \left[x^n \cosh x\right]_0^1 - n\left(\left[x^{n-1} \sinh x\right]_0^1 - (n-1)\int_0^1 x^{n-2} \sinh x \, dx\right)$
	$I_n = \cosh 1 - n\left(\sinh 1 - (n-1)I_{n-2}\right) = \cosh 1 - n\sinh 1 + n(n-1)I_{n-2}$
1(b)	$I_2 = \cosh 1 - 2\sinh 1 + 2I_0$
	$I_2 = 3\cosh 1 - 2\sinh 1 - 2$
2(a)	$1 + 2\sinh^2 x = 6\sinh^2 x \Rightarrow \sinh x = \pm\frac{1}{2}$
	$x = \sinh^{-1}\left(\pm\frac{1}{2}\right) = \ln\left(\pm\frac{1}{2} + \sqrt{\frac{1}{4}+1}\right)$
	$x = \ln\left(\pm\frac{1}{2} + \frac{1}{2}\sqrt{5}\right)$

2(b)



3(a)	$\sin 5\theta = \text{Im}(\cos\theta + \text{i}\sin\theta)^5 = \sin^5\theta - 10\sin^3\theta\cos^2\theta + 5\sin\theta\cos^4\theta$
	$= \sin^5\theta - 10\sin^3\theta(1-\sin^2\theta) + 5\sin\theta(1-\sin^2\theta)^2$
	$= 16\sin^5\theta - 20\sin^3\theta + 5\sin\theta$
3(b)	$x = \sin\theta, \quad \sin 5\theta = \frac{1}{2}\sqrt{3}$
	$5\theta = \frac{1}{3}\pi + 2k\pi$ or $5\theta = \frac{2}{3}\pi + 2k\pi$
	$\sin\left(\frac{1}{15}\pi\right)$
	$\sin(\frac{2}{15}\pi), \sin(-\frac{5}{15}\pi), \sin(-\frac{4}{15}\pi), \sin(\frac{7}{15}\pi)$

	$\frac{1}{N} \to 0$ as $N \to \infty$.

5(a)	$m^2+m+1=0 \Rightarrow m=-\frac{1}{2}\pm\frac{1}{2}\sqrt{3}$
	$y=e^{-\frac{1}{2}x}\left(A\cos\frac{\sqrt{3}}{2}x+B\sin\frac{\sqrt{3}}{2}x\right)$
	$y=p\sin 2x+q\cos 2x \Rightarrow y'=2p\cos 2x-2q\sin 2x \Rightarrow y''=-4p\sin 2x-4q\cos 2x$
	$-4p-2q+p=1$ $\quad$ $-4q+2p+q=1$
	$p=-\frac{1}{13}$ $\quad$ $q=-\frac{5}{13}$
	$y=e^{-\frac{1}{2}x}\left(A\cos\frac{\sqrt{3}}{2}x+B\sin\frac{\sqrt{3}}{2}x\right)-\frac{1}{13}\sin 2x-\frac{5}{13}\cos 2x$
5(b)	$y\approx-\frac{1}{13}\sin 2x-\frac{5}{13}\cos 2x=\sqrt{\frac{2}{13}}\left(-\frac{1}{\sqrt{26}}\sin 2x-\frac{5}{\sqrt{26}}\cos 2x\right)$
	$\sqrt{\frac{2}{13}}\sin(2x-1.77)$

	$1-2x-x^2=2-(x+1)^2$
	$\int\frac{1}{\sqrt{2-(x+1)^2}}\,dx=\sin^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+C$
	$\pi=\sin^{-1}\frac{1}{\sqrt{2}}+C \Rightarrow C=\frac{3}{4}\pi$
	$\frac{y}{\sqrt{1-2x-x^2}}=\sin^{-1}\left(\frac{x+1}{\sqrt{2}}\right)+\frac{3}{4}\pi$