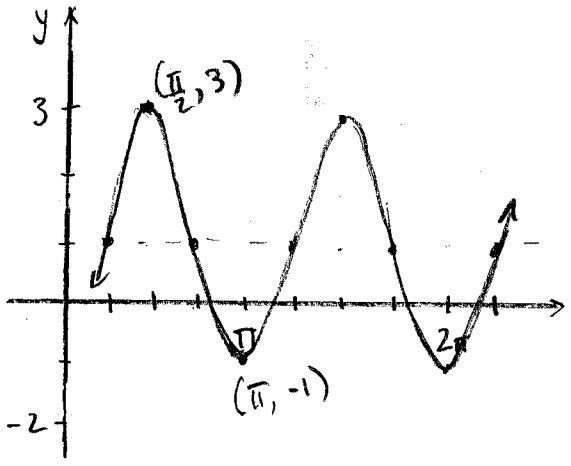
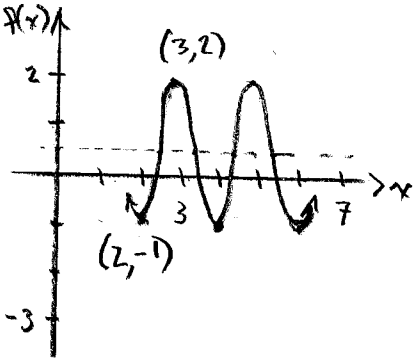
1. (a) $y = 2\sin\left(2x - \frac{\pi}{2}\right) + 1$

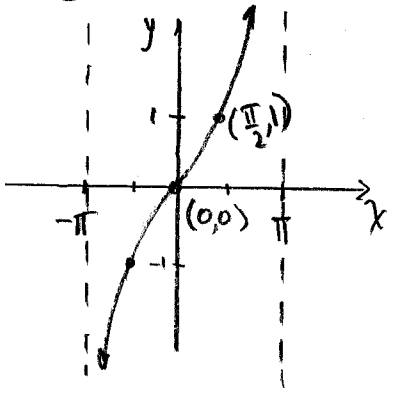
$= 2\sin 2\left(x - \frac{\pi}{4}\right) + 1$



(b) $f(x) = -\frac{3}{2}\cos\pi(x-2) + \frac{1}{2}$



(c) $y = \tan\left(\frac{1}{2}x\right)$



2. (a) $3 + \log_4(x-1) = 7$

$\log_4(x-1) = 4$

$x - 1 = 256$

$x = 255$

(b) $2 + 3e^{x-5} = 5$

$3e^{x-5} = 3$

$e^{x-5} = 1$

$x - 5 = 0$

$x = 5$

(c) $x^2 + 13 = 4x$

$x^2 - 4x + 13 = 0$

$x = \frac{4 \pm \sqrt{-36}}{2} = \frac{4 \pm 6i}{2}$

$x = 2 \pm 3i$

(d) $x^4 - 1 = 0$

1	1	0	0	0	-1
		1	1	1	1
-1	1	1	1	1	0
		-1	0	-1	
	1	0	1	0	

So, $(x-1)(x+1)(x^2+1) = 0$

So

$x = 1, -1, \pm i$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

3. (a) $(2x+1)^5 = 1(2x)^5 1^0 + 5(2x)^4 1^1 + 10(2x)^3(1^2) + 10(2x)^2(1^3) + 5(2x)^1(1^4) + 1(1)^5$

$(2x+1)^5 = 32x^5 + 80x^4 + 80x^3 + 40x^2 + 10x + 1.$

3. (b)

$$(x^2-2y)^6 = 1(x^2)^6(-2y)^0 + 6(x^2)^5(-2y)^1 + 15(x^2)^4(-2y)^2 + 20(x^2)^3(-2y)^3 + 15(x^2)^2(-2y)^4 + 6(x^2)^1(-2y)^5 + 1(-2y)^6$$

$$= x^{12} - 12x^{10}y + 60x^8y^2 - 160x^6y^3 + 240x^4y^4 - 192x^2y^5 + 64y^6$$

4. (a) $\sin\left(\frac{25\pi}{3}\right) = \frac{\sqrt{3}}{2}$ (b) $\cos\left(\frac{7\pi}{4}\right) = \frac{\sqrt{2}}{2}$ (c) $\tan\left(-\frac{7\pi}{6}\right) = \frac{-1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$.

5. $y = 2\cos\pi(x+1) + 1$

6. $a_n = 2n - 4$

$50 = 2n - 4$

$54 = 2n$

$27 = n$ (so 50 is the 27^{th} term)

$\longrightarrow -2 + 0 + 2 + \cdots + 50 = \sum_{n=1}^{27}(2n-4)$.

7. (a) $\begin{cases} a_1 = 100 \\ a_n = \frac{1}{5}a_{n-1} \end{cases}$ (b) $a_n = 100\left(\frac{1}{5}\right)^{n-1}$, $n = 1, 2, 3, \ldots$

(c) $\sum_{n=1}^{15} 100\left(\frac{1}{5}\right)^{n-1} = \frac{100\left(1-\left(\frac{1}{5}\right)^{15}\right)}{1-\left(\frac{1}{5}\right)} \approx 125$

(d) $\sum_{n=1}^{\infty} 100\left(\frac{1}{5}\right)^{n-1} = 125.$