1. (a) $x^2 + 13 = 4x$

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

$x = \frac{4 \pm \sqrt{-36}}{2} = \frac{4 \pm 6i}{2} = 2 \pm 3i$

(b) $(\sqrt{x+3})^2 = (\sqrt{2x-1})^2$

$x + 3 = 2x - 1$

$4 = x$

(c) $12 = 3^{x+5} - 7$

$19 = 3^{x+5}$

$\log_3 19 = x + 5$

$-5 + \log_3 19 = x.$

(d) $5\ln(x-2) = 20$

$\ln(x-2) = 4$

$x - 2 = e^4$

$x = 2 + e^4$

(d) $\cos\left(x - \frac{\pi}{6}\right) = 0$

$x - \frac{\pi}{6} = \cos^{-1}(0)$

$x - \frac{\pi}{6} = \frac{\pi}{2} + 2\pi n$ or $\frac{3\pi}{2} + 2\pi n$, $n \in \mathbb{I}$

$x = \frac{2\pi}{3} + 2\pi n$ or $\frac{5\pi}{3} + 2\pi n.$

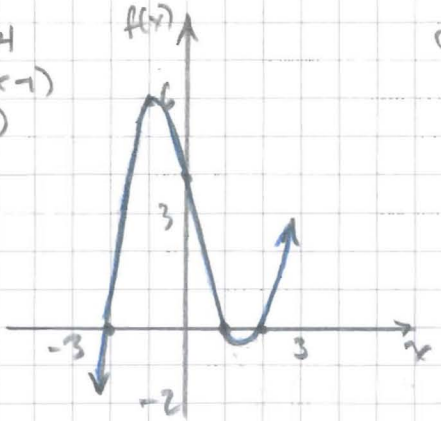
2. (a) $f(x) = x^3 - x^2 - 4x + 4$

$= x^2(x-1) - 4(x-1)$

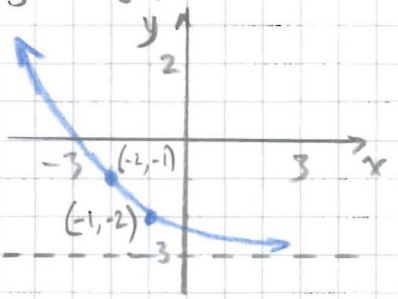
$= (x-1)(x^2 - 4)$

Roots: $x = 1, \pm 2$

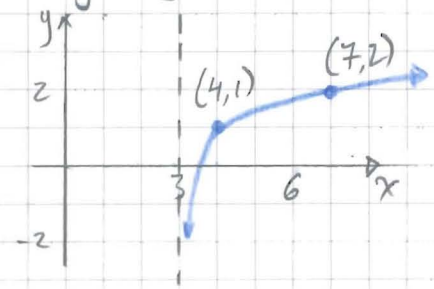
y-int: $y = 4$



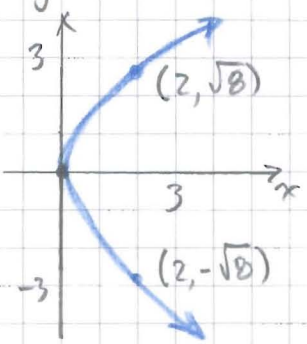
(b) $y = 2\left(\frac{1}{2}\right)^{x+2} - 3$



(c) $y = \log_4(x-3) + 1$

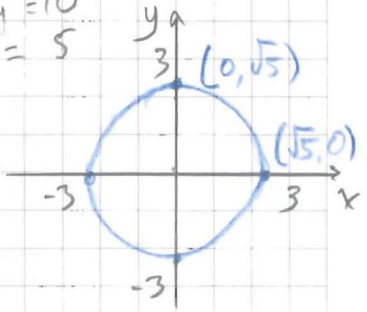


(d) $y^2 = 4x$

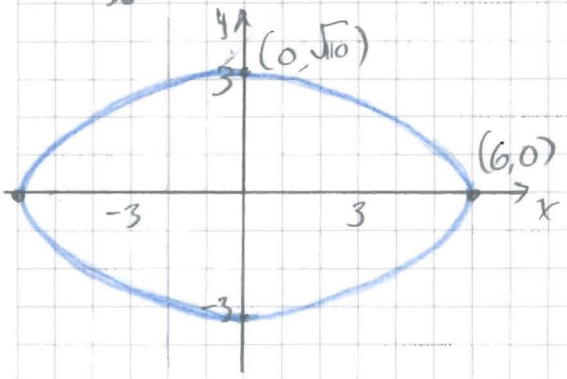


(e) $2x^2 + 2y^2 = 10$

$x^2 + y^2 = 5$

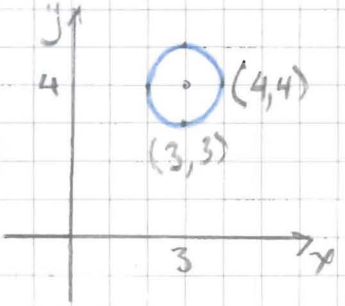


(f) $\frac{x^2}{36} + \frac{y^2}{10} = 1$

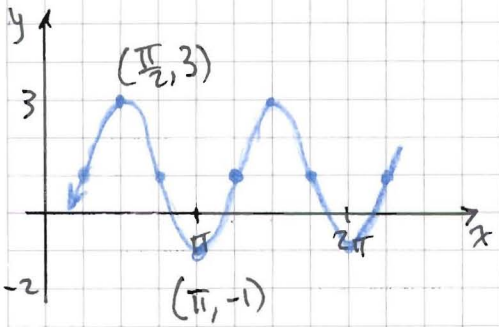


(g) $x^2 - 6x + 9 - 9 + y^2 - 8y + 16 - 16 + 24 = 0$

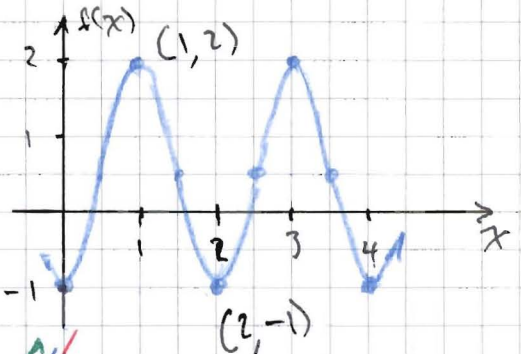
$(x-3)^2 + (y-4)^2 = 1$



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

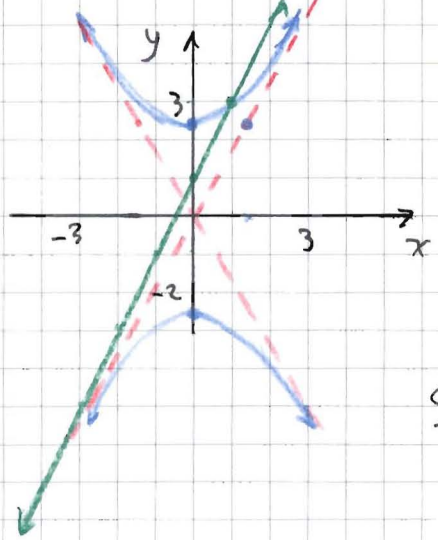


(i) $f(x) = -\frac{3}{2}\cos\pi(x-2) + \frac{1}{2}$



3. (a) $\frac{3x^2}{-6} - \frac{y^2}{-6} = \frac{-6}{-6}$

$\frac{y^2}{6} - \frac{x}{2} = 1$



(b) $3x^2 - (2x+1)^2 = -6$

$3x^2 - 4x^2 - 4x - 1 = -6$

$-x^2 - 4x + 5 = 0$

$(-x + 1)(x + 5) = 0$

If $x = 1$, $y = 3$ or if $x = -5$, $y = -9$

So $(x, y) = (1, 3)$ or $(-5, -9)$

4. (a) $\begin{cases} a_1 = 2 \\ a_n = \frac{3}{2} a_{n-1} \end{cases}$ (b) $a_n = 2\left(\frac{3}{2}\right)^{n-1}$ (c) $\sum_{n=1}^{15} 2\left(\frac{3}{2}\right)^{n-1} = \frac{2\left(1 - \frac{3}{2}^{15}\right)}{1 - \frac{3}{2}}$

≈ 1747.575

5. (a) $\sum_{i=0}^{\infty} \left(\frac{1}{4}\right)^i = \frac{1}{1 - \frac{1}{4}} = \frac{4}{3}$ (b) $\sum_{i=1}^{20} (2i+1) = \frac{20(3+41)}{2}$

$= 440$

(c) Infinite sum (since $\frac{10}{7} > 1$).

6. $-2 + 0 + 2 + 4 + \cdots + 12 = \sum_{n=1}^{8} 2n - 4$.

$12 = 2n - 4$

$16 = 2n$

$8 = n$, 12 is the 8th term...

7. (a) $A = \cos^{-1}\left(\frac{6^2 - 10^2 - 13^2}{-2(10)(13)}\right) \approx 26.343°$

$B = \cos^{-1}\left(\frac{10^2 - 6^2 - 13^2}{-2(6)(13)}\right) \approx 47.695°$

$C = 180° - A - B \approx 105.962°$

(b) Area $A = \frac{1}{2} b h$

$= \frac{1}{2}(13)(10 \sin A)$

Area $\approx 28.84\ m^2$.

8. $1000 = 500\left(1 + \frac{.025}{12}\right)^{12t}$

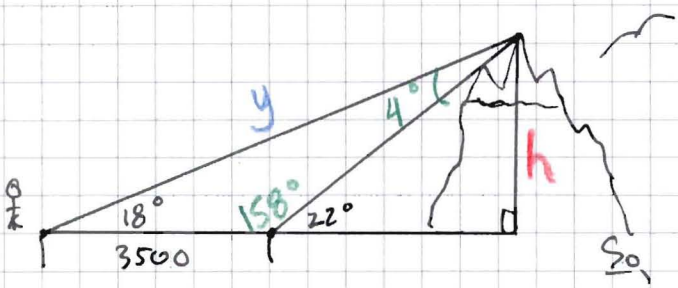
$2 = (1.0020833)^{12t}$

$\log_{1.0020833}(2) = 12t$

$\frac{\log_{1.0020833}(2)}{12} = t \approx 27.75$

IT WILL TAKE ABOUT 28 YEARS FOR THE $500 TO DOUBLE.

9.



$\frac{y}{\sin 158^\circ} = \frac{3500}{\sin 4^\circ}$

$y = \frac{3500 \sin 158^\circ}{\sin 4^\circ} \approx 18795.72$ FT

So, $h = y \sin 18^\circ \approx 5808.196$ FT

10. $y = -2\cos \pi x + 1$