① $f: [-\frac{1}{2}, \infty) \to \mathbb{R}$

$f'(x) = (\sqrt{2x+1})' = \frac{1}{2\sqrt{2x+1}}$

$\frac{1}{2\sqrt{2x+1}} > 0$ i intervallet

$\sqrt{2x+1} = y$

$y^2 = 2x+1$

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

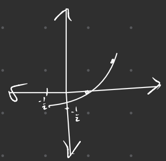
$g(x) = \frac{x^2}{2} - \frac{1}{2}$

$g(-\frac{1}{2}) = \frac{(-\frac{1}{2})^2}{2} - \frac{1}{2} = \frac{1}{8} - \frac{1}{2} = -\frac{3}{8}$

$g(0) = -\frac{1}{2}$

$g(1) = \frac{1}{2} - \frac{1}{2} = 0$

$g(2) = \frac{3}{2}$



② $V = 2\pi \cdot \int_0^{\frac{\pi}{2}} x \cdot \cos x \, dx$ $\quad u = x \quad u' = 1$ $\quad v = \sin x \quad v' = \cos x$

$V = 2\pi \cdot \Big|_0^{\frac{\pi}{2}} x \cdot \sin x - \int \sin x \, dx = 2\pi \cdot \Big|_0^{\frac{\pi}{2}} x \sin x - \cos x = 2\pi \cdot \left(\left(\frac{\pi}{2} \cdot \sin\frac{\pi}{2} - \cos\frac{\pi}{2} \right) - (0 \cdot \sin 0 - \cos 0) \right) = \underline{\frac{\pi}{2} \cdot \left(\frac{\pi}{2} + 1 \right)}$

③ a) $x = 1 + \arctan x$

b) $f(x) = x \quad f'(x) = 1$ $\quad g(x) = 1 + \arctan x$

$g'(x) = \frac{1}{1+x^2}$ $\quad g'(x) \le 1$

$\underline{f'(x) \le 1}$

c)
```
import numpy as np
x = 3
for i in range(100):
    x = 1 + np.arctan(x)
```

④
```
import numpy as np
y = 1
b = 1
n = 10000
h = b/n
for i in range(n):
    yneste = y - h*np.sqrt(y)
    y = y - h*np.sqrt(yneste)
```

⑤ $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 6 \end{bmatrix}$ $\quad D = 1\begin{vmatrix} 2 & 3 \\ 3 & 6 \end{vmatrix} - 1\begin{vmatrix} 1 & 3 \\ 1 & 6 \end{vmatrix} + 1\begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix}$

$D = 1(2\cdot6 - 3\cdot3) - (1\cdot6 - 3\cdot1) + (1\cdot3 - 2\cdot1) = 12 - 9 - 6 + 3 + 3 - 2 = \underline{1}$

Ja siden matrisen er lineært uavhengig

⑥ $\sum_{n=1}^{\infty} \frac{n}{3^{n-1}}$

$\left(\sum_{n=1}^{\infty} x^n \right)' = \left(\frac{1}{1-x} \right)' \to \sum_{n=1}^{\infty} n x^{n-1} = \frac{1}{(1-x)^2}$

$\sum_{n=1}^{\infty} \frac{n}{3^{n-1}} = \sum_{n=1}^{\infty} n \left(\frac{1}{3}\right)^{n-1} = \frac{1}{(1-\frac{1}{3})^2} = \frac{1}{(\frac{2}{3})^2} = \underline{\frac{9}{4}}$