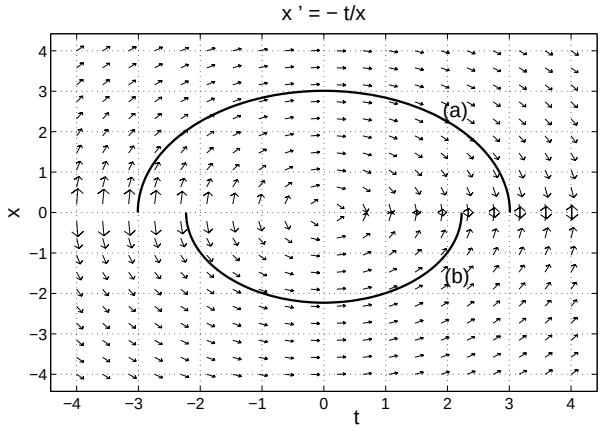
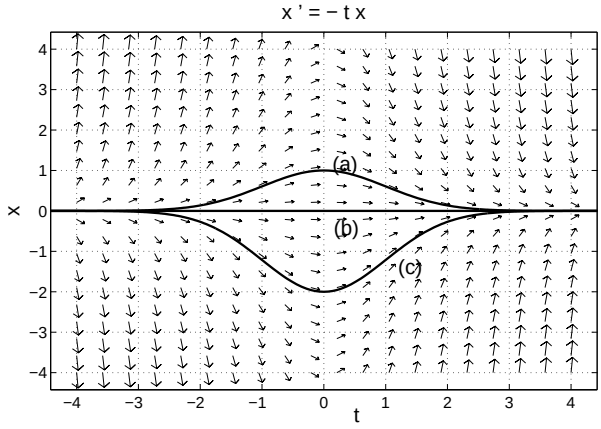
Probleem 1:

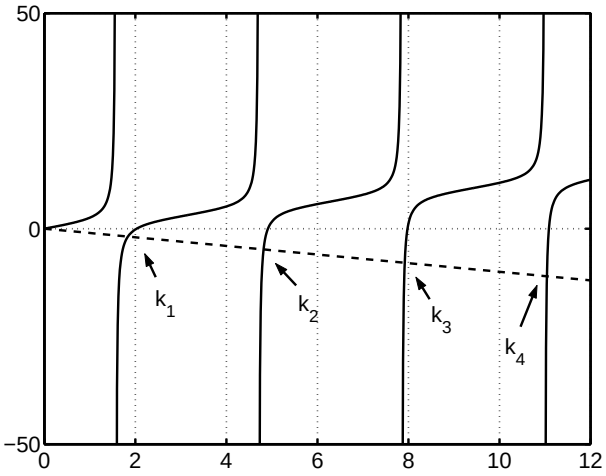


Probleem 2:



Probleem 3:

(a)



(b) In hierdie voorbeeld is

$$\begin{aligned} f(x) &= x - \tan(x) \\ f'(x) &= 1 - \sec^2(x) \end{aligned}$$

dus is Newton se formule

$$\begin{aligned} x_{n+1} &= x_n - \frac{f(x_n)}{f'(x_n)} \\ &= x_n - \frac{x_n + \tan(x_n)}{1 + \sec^2(x_n)} \end{aligned}$$

(c)

n	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}
0	2.00000000000000	-0.18503986326152	6.77439920404192	2.02731457915133
1	2.02731457915133	-0.00884845510464	6.14595990207050	2.02875429812862
2	2.02875429812862	-0.00002165015748	6.11593184834415	2.02875783808917

$\Rightarrow$ skatting 2.02875783808917.

(d)

```
% TW244: Oplos van modelprobleem f(x) = x+tan(x)
% met Newton se metode

F  = inline('x + tan(x)');        % Definieer funksie
DF = inline('1 +sec(x)*sec(x)');  % Definieer afgeleide

toler = 1e-5;                   % Spesifiseer toleransie
del = 1;                         % Inisialiseer delta
x   = 2;                       % Aanvanklike skatting
X   = x;                         % Stoor benaderings in X
```

```
while abs(del) > toler;         % Begin iterasie
    del = F(x)/DF(x);           % Bereken delta
    x = x - del;                % Newton se metode
    X = [X; x];                 % Voeg nuwe x by lys van oues
end

>> newton
>> X

X =  2.00000000000000
     2.02731457915133
     2.02875429812862
     2.02875783808917
```

(e)
```
% TW244:  Oplos van modelprobleem f(x) = x +tan(x) met die snylyn (secant) metode

F  = inline('x+tan(x)');      % Definieer funksie

toler = 1e-5;                   % Spesifiseer toleransie
del = 1;                        % Inisialiseer delta
x0   = 2; x1 = 2.1;             % Aanvanklike skatting
X   = [x0; x1];                 % Stoor benaderings in X
f0 = F(x0); f1 = F(x1);         % Bereken funksiewaardes

while abs(del) > toler;         % Begin iterasie
    del = f1*(x1-x0)/(f1-f0);   % Bereken delta
    x2 = x1 - del;              % Newton se metode
    X = [X; x2];                % Voeg nuwe x by lys van oues
    x0 = x1; x1 = x2;
    f0 = f1; f1 = F(x2);        % Let op: dei funksie word slegs eenkeer
                                % per iterasie ge-evalueer
end

>> format long
>> secant
>> X

X =   2.00000000000000
      2.10000000000000
      2.03217002992084
      2.02836019241269
      2.02876013728864
      2.02875783966227
```

(f)
```
>> x = fzero('x+tan(x)',2)

x =  2.02875783811043
```

Probleem 4

(a) $\frac{dy}{dx} = e^{2x-y} = e^{2x} \cdot e^{-y}$ (Skeibaar)

$$\int e^{y}\,dy = \int e^{2x}\,dx$$

$$e^{y} = \tfrac{1}{2}e^{2x} + k$$

$$y = \log\left(\tfrac{1}{2}e^{2x} + k\right) \longrightarrow$$

Toets: $\frac{dy}{dx} = \frac{1}{\frac{1}{2}e^{2x}+k}\left(e^{2x}\right) = \frac{e^{2x}}{e^{y}} = e^{2x-y}$ ✓

(b)

$$x^{2}\frac{dy}{dx} = xy + 3x^{2}$$

$$\frac{dy}{dx} - \frac{1}{x}y = 3x^{2}$$

$$I(x) = e^{\int -1/x\,dx} = e^{\ln 1/x} = 1/x$$

$$\Rightarrow \frac{1}{x}\frac{dy}{dx} - \frac{1}{x^{2}}y = 3\frac{1}{x}x^{2}$$

$$\frac{d}{dx}\left(\frac{1}{x}y\right) = 3x$$

$$\frac{y}{x} = 3\int x\,dx = \frac{3}{2}x^{2} + k$$

$$y = \frac{3}{2}x^{3} + kx \longrightarrow$$