SVAR MVE340 7/10-2016

1a $\frac{1+x^2}{3x+2} \to \frac{1}{2}, x \to 0$

1b $f' = 2x+3$

T: $y = 1\cdot(x+1)$

N: $y = -(x+1)$

1c $(x+1)(x+2) = f'$

$\begin{array}{ccccc} & -2 & & -1 & \\ + & & - & & + \end{array}$

$-2 \le x \le -1$

1d $f(2.7) \approx \frac{f(3)-f(2)}{3-2}\cdot(2.7-3) + f(3) = (-0.7)(-0.3) - 0.1$

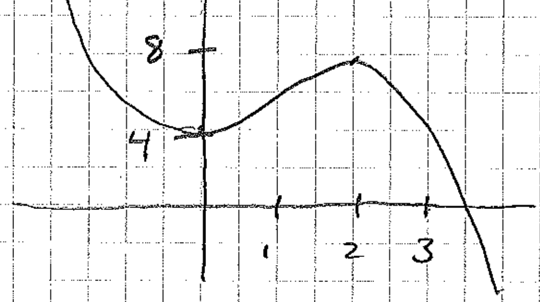
$= 0.11$

2a $-3x^2+6x$

$\begin{array}{ccccc} & 0 & & 2 & \\ - & & + & & - \\ \searrow & & \nearrow & & \searrow \end{array}$

$f(0) = 4$

$f(2) = 8$



2b

x	y
3	4
4	-12

$x_0 = 3 \quad x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 3.44 \quad x_2 = 3.36$

$f(x_1) = -1.27 \quad f(x_2) = -0.05$

2c $x^2 = 2x+3 \quad x = -1$ el 3

$\int_{-1}^{3} (2x+3-x^2)\,dx = \left[x^2+3x-\frac{x^3}{3}\right]_{-1}^{3} = \frac{32}{3}$

3a $2A + 2Ax + B - 4Ax^2 - 4Bx = 8x^2 - 16x - 1$

$-4A = 8 \quad 2A - 4B = -16 \quad 2A + B = -1 \qquad A = -2, B = 3$

3b $y' = -\frac{1}{2}y \quad y = Ce^{-\frac{t}{2}} \quad 2y(0) + y'(0) = 2C - \frac{C}{2} = 3 \quad C = 2$

3c $y = e^{-\frac{3}{2}t}\left(C_1 \cos\frac{\sqrt{7}}{2}t + C_2 \sin\frac{\sqrt{7}}{2}t\right)$

$y(0) = C_1 = -1$

$y' = -\frac{3}{2}e^{-\frac{3}{2}t}(C_1\cos + C_2\sin) + \frac{\sqrt{7}}{2}e^{-\frac{3}{2}t}(-C_1\sin + C_2\cos)$

$y'(0) = -\frac{3}{2}C_1 + \frac{\sqrt{7}}{2}C_2 = -2 \qquad C_2 = \frac{4}{3-\sqrt{7}} = 2(3+\sqrt{7})$

4a $4(1+t)-2(-3t)+3(1+2t)=-1 \quad 16t=-8 \quad t=-\frac{1}{2}$

$(x,y,z)=(\frac{1}{2},\frac{3}{2},0)$

4b $2x+y-5z=D \quad D=2\cdot 3+0-5\cdot 4=-14$

4c
$$\left.\begin{aligned} 55k+15m &= -29.8 \\ 15k+5m &= -7.4 \end{aligned}\right\} (-3) \qquad \begin{aligned} k &= -0.76 \\ m &= 0.8 \end{aligned}$$

4d
```
A=[1 1;2 1;3 1;4 1;5 1];
y=[0.3;-1.1;-1.5;-2.1;-3.0];
A\y
```

5a $\tan x = t \quad \int_0^1 (1+t^2)^2 \frac{dt}{1+t^2} = \left[t+\frac{t^3}{3}\right]_0^1 = \frac{4}{3}$

$dx = \frac{dt}{1+t^2}$

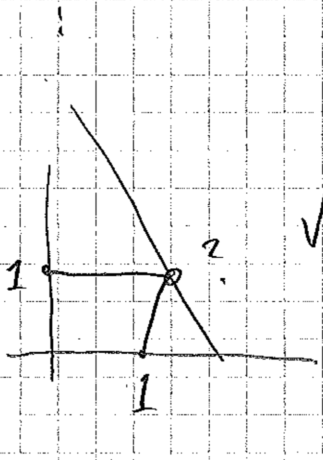
5b $t=x^2 \quad \frac{1}{2}\int_1^\infty \frac{dt}{t(1+t^2)} = \frac{1}{2}\int_1^\infty \left(\frac{1}{t}-\frac{t}{1+t^2}\right)dt$

$= \frac{1}{2}\left[\ln\frac{t}{\sqrt{1+t^2}}\right]_1^\infty = \frac{1}{4}\ln 2$

6 $(x-a)^2+(y-b)^2+(z-c)^2=r^2$

$$\left.\begin{aligned} (0-a)^2+(2-b)^2+(1-c)^2 &= r^2 \\ (1-a)^2+(-1-b)^2+(2-c)^2 &= r^2 \\ &\vdots \end{aligned}\right\} (-1) \qquad \begin{aligned} a &= \frac{31}{2} \\ b &= 12 \\ c &= 21 \\ r &= \frac{3}{2}\sqrt{329} \end{aligned}$$

7



$\sqrt{(x-1)^2+(5-3x)^2}+\sqrt{x^2+(4-3x)^2}=f$

$f'=\frac{x-1+(5-3x)(-3)}{\sqrt{}}+\frac{x+(4-3x)\cdot(-3)}{\sqrt{}}=0$

$\frac{10x-16}{\sqrt{}}+\frac{10x-12}{\sqrt{}}=0 \quad - - - \quad x=\frac{22}{15}$