Øving 7 MA0001 H17 LF

Oppgave 1:

$$f'(x)=\lim_{h\to\infty}\frac{(3(x+h)-(x+h)^2)-(3x-x^2)}{h}$$

$$f'(x)=\lim_{h\to\infty}\frac{(3x-3h-(x^2+2xh+h^2))-3x+x^2}{h}$$

$$f'(x)=\lim_{h\to\infty}\frac{3x+3x-x^2-2xh-h^2-3x+x^2}{h}$$

Stryker i telleren:

$$f'(x)=\lim_{h\to\infty}\frac{3h-2xh-h^2}{h}=\frac{h(3-2x-h)}{h}=3-2x-h=3-2x$$

$$f'(x)=3-2x$$

Oppgave 2:

a)

$$f(x)=\frac{3x-x^2}{\sqrt{x}}$$

Bruker brøkregelen ($\frac{u'*v-v'*u}{v^2}$):

$$f'(x)=\frac{(3x-x^2)'\sqrt{x}-(3x-x^2)(\sqrt{x})'}{(\sqrt{x})^2}$$

$$f'(x)=\frac{(3-2x)\sqrt{x}-(3x-x^2)\frac{1}{2\sqrt{x}}}{(\sqrt{x})^2}$$

$$f'(x)=\frac{3-2x}{\sqrt{x}}-\frac{\frac{3x-x^2}{2\sqrt{x}}}{(\sqrt{x})^2}$$

$$f'(x)=\frac{3-2x}{\sqrt{x}}-\frac{3x-x^2}{2\sqrt{x}}*\frac{1}{x}=\frac{3-2x}{\sqrt{x}}-\frac{3x-x^2}{2x\sqrt{x}}$$

$$f'(x)=\frac{(3-2x)*2x}{2x\sqrt{x}}-\frac{3x-x^2}{2x\sqrt{x}}=\frac{6x-4x^2-3x+x^2}{2x\sqrt{x}}$$

$$f'(x)=\frac{3x-3x^2}{2x\sqrt{x}}=\frac{3x(1-x)}{2x\sqrt{x}}=\frac{3(1-x)}{2\sqrt{x}}$$

b)

$$f(x)=\frac{3x-x^2}{\sqrt{x}}=\frac{3x}{\sqrt{x}}-\frac{x^2}{\sqrt{x}}=3x^{(1-0.5)}-x^{(2-0.5)}=3\sqrt{x}-x^{(3/2)}$$

$$(3\sqrt{x}-x^{(3/2)})'=3\frac{1}{2\sqrt{x}}-\frac{3}{2}x^{(0.5)}$$

$$=\frac{3}{2\sqrt{x}}-\frac{3\sqrt{x}}{2}$$

$$=\frac{3}{2\sqrt{x}}-\frac{3\sqrt{x}*\sqrt{x}}{2*\sqrt{x}}=\frac{3}{2\sqrt{x}}-\frac{3x}{2\sqrt{x}}=\frac{3(1-x)}{2\sqrt{x}}$$

Oppgave 3:

$h(x)=\cos^2 x+\sin^2 x$

$\cos^2 x+\sin^2 x$ er definert som 1, derfor er

$h(x)=1$

$h'(x)=0$