Tarea — Romero Medina Alberto

Derivadas de Funciones vectoriales

1. Si $r(t) = (t^3)\hat{i} + (3t)\hat{j} + (t^4)\hat{k}$

$\frac{d}{dt}(t^3) = 3(1)t^{3-1} = 3t^2$

$\frac{d}{dt}(3t) = 3$

$\frac{d}{dt}(t^4) = 4t^3$

$r't = (3t^2)\hat{i} + (3)\hat{j} + (4t^3)\hat{k}$ //

1. Si $r(t) = (1+t^3)\hat{i} + (te^{-t})\hat{j} + \left(\frac{\operatorname{sen} t}{t}\right)\hat{k}$

$\frac{d}{dt}(1+t^3) = 3t^2$

$\frac{d}{dt}(te^{-t}) = -e^{-t}(t-1)$

$\frac{d}{dt}\left(\frac{\operatorname{sen} t}{t}\right) = \frac{t\cos(t) - \sin(t)}{t^2}$

$r't = (3t^2)\hat{i} + (-e^{-t}(t-1))\hat{j} + \left(\frac{t\cos(t) - \sin(t)}{t}\right)\hat{k}$ //

2. Si $f(t) = \left< \frac{\operatorname{sen}(t)}{t}, t^2+t, 3 \right>$

$\frac{d}{dt}\left(\frac{\operatorname{sen}(t)}{t}\right) = \left(\frac{\cos(t)}{t} - \frac{\sin(t)}{t^2}\right)$

$\frac{d}{dt}(t^2+t) = (1+2t)$

$\frac{d}{dt}(3) = 0$

$f'(t) = \left(\frac{\cos(t)}{t} - \frac{\sin(t)}{t^2}, 1+2t, 0\right)$ //

3. Sea $x = 2t^2$, $y = 3t^3$, $z = t$

$\frac{d}{dt}(2t^2) = 4t$

$\frac{d}{dt}(3t^3) = 9t^2$

$\frac{d}{dt}(t) = 1$

$r'(t) = (4t, 9t^2, 1)$ //

5. Sea $x = t-4$, $y = \sqrt{t+1}$, $z = \frac{\sin(t)}{2t}$

$d/dt\,(t-4) = 1$

$d/dt\,(\sqrt{t+1}) = \frac{1}{2\sqrt{t+1}}$

$d/dt\left(\frac{\sin(t)}{2t}\right) = \frac{t\cos(t)-\sin(t)}{2t^2}$

$r'(t) = \left(1,\ \frac{1}{2\sqrt{t+1}},\ \frac{t\cos(t)-\sin(t)}{2t^2}\right)$ //

6. Si $r(t) = \left\langle \frac{e^t-1}{2t},\ \frac{7t-\sin(t)}{t^2+\sin(3t)},\ \frac{\ln(1+2t)}{\sin(t)} \right\rangle$

$\frac{d}{dt}\left(\frac{e^t-1}{2t}\right) = \frac{e^t(t-1)+1}{2t^2}$

$\frac{d}{dt}\left(\frac{7t-\sin(t)}{t^2+\sin(3t)}\right) = \frac{7-\cos(t)}{t^2+\sin(3t)} - \frac{(7t-\sin(t))(2t+3\cos(3t))}{(t^2+\sin(3t))^2}$

$\frac{d}{dt}\left(\frac{\ln(1+2t)}{\sin(t)}\right) = \csc(t)\left(\frac{2}{1+2t} - \ln(1+2t)\cot(t)\right)$

$r't = \left(\frac{e^t(t-1)+1}{2t^2},\ \frac{7-\cos(t)}{t^2+\sin(3t)} - \frac{(7t-\sin(t))(2t+3\cos(3t))}{(t^2+\sin(3t))^2},\ \left(\csc(t)\left(\frac{2}{1+2t} - \ln(1+2t)\cot(t)\right)\right)\right)$ //

7. Sea $x = \frac{1}{t} - \frac{1}{e^t-1}$, $y = \frac{2-2\cos(t)-t^2}{t^4}$, $z = \frac{\sqrt[3]{(\cos(t-1))^2}}{\tan(t)}$

$\frac{d}{dt}\left(\frac{1}{t} - \frac{1}{e^t-1}\right) = \frac{e^t}{(e^t-1)^2} - \frac{1}{t^2}$

$\frac{d}{dt}\left(\frac{2-2\cos(t)-t^2}{t^4}\right) = \frac{2(t^2+t\sin(t)+4\cos(t)-4)}{t^5}$

$$\frac{d}{dt}\left(\frac{\sqrt[3]{(\cos(t-1))^2}}{\tan(t)}\right) = \frac{2(t-1)\cot(t)}{3((t-1))^{2/3}} - \sqrt[3]{(t-1)^2}\csc^2(t)$$

$$\gamma'(t) = \left(\frac{e^t}{(e^t-1)^2} - \frac{1}{t^2},\ \frac{2(t^2+t\sin(t)+4\cos(t)-4)}{t^3},\right.$$

$$\left.\frac{2(t-1)\cot(t)}{3((t-1))^{2/3}} - \sqrt[3]{(t-1)^2}\csc^2(t)\right) //$$

8. Sea $r(t) = \left\langle \frac{1+t^2}{\text{sen}(\pi t)},\ \frac{t-3t^{2/3}+3t^{1/3}-1}{(t-1)^2},\ \frac{\ln(t)}{\text{sen}(\pi t)} \right\rangle$

$$\frac{d}{dt}\left(\frac{1+t^2}{\text{sen}(\pi t)}\right) = 2t\csc(\pi t) - \pi(1+t^2)\cot(\pi t)\csc(\pi t)$$

$$\frac{d}{dt}\left(\frac{t-3t^{2/3}+3t^{1/3}-1}{(t-1)^2}\right) = \frac{1+\frac{2}{t^{2/3}}-\frac{2}{t^{1/3}}}{(1-t)^2} + \frac{2(-1+3t^{1/3}-3t^{2/3}+t)}{(1-t)^3}$$

$$\frac{d}{dt}\left(\frac{\ln(t)}{\text{sen}(\pi t)}\right) = \frac{\csc(\pi t)}{t} - \pi\cot(\pi t)\csc(\pi t)\operatorname{Log}(t)$$

$$\gamma'(t) = \left(2t\csc(\pi t) - \pi(1+t^2)\cot(\pi t)\csc(\pi t),\right.$$

$$\frac{1+\frac{2}{t^{2/3}}-\frac{2}{t^{1/3}}}{(1-t)^2} + \frac{2(-1+3t^{1/3}-3t^{2/3}+t)}{(1-t)^3},$$

$$\left.\frac{\csc(\pi t)}{t} - \pi\cot(\pi t)\csc(\pi t)\operatorname{Log}(t)\right) //$$

9. Si $r(t) = \left(\frac{1-\cos(3t)}{\sin^2(2t)}\right)\hat{\imath} + \left(\frac{\ln(1+6t)}{t}\right)\hat{\jmath} + \left(\frac{\sqrt{4+t}-\sqrt{4-t}}{4t}\right)\hat{k}$

$$\frac{d}{dt}\left(\frac{1-\cos(3t)}{(\sin(2t))^2}\right) = \csc^2(2t)\left(3\sin(3t)\right) + 4\left(\cos(3t)-1\right)\cot(2t))$$

$$\frac{d}{dt}\left(\frac{\ln(1+6t)}{t}\right) = \frac{\frac{6t}{1+6t} - \ln(1+6t)}{t^2}$$

$$\frac{d}{dt}\left(\frac{\sqrt{4+t}-\sqrt{4-t}}{4t}\right) = \frac{\frac{1}{2\sqrt{4+t}} + \frac{1}{2\sqrt{4-t}}}{4t} - \frac{\sqrt{4+t}-\sqrt{4-t}}{4t^2}$$

TEMA

FECHA

$$r'(t) = \left(\csc^2(2t)(3\sin(3t)) + 4(\cos(3t)-1)\cot(2t)\right)i + \left(\frac{\frac{6t}{1+6t} - \ln(1+6t)}{t^2}\right)j$$

$$+ \left(\frac{\frac{1}{2\sqrt{4+t}} + \frac{1}{2\sqrt{4-t}}}{4t} - \frac{\sqrt{4+t} - \sqrt{4-t}}{4t^2}\right)k \quad //$$