W3-P1

In[1]:=
$$\text{Limit}\left[\frac{\left(2\,(x+\Delta x)^2+3\,(x+\Delta x)+4\right)-\left(2x^2+3x+4\right)}{\Delta x},\ \Delta x\to 0\right]$$

Out[1]=
$$3+4x$$

In[2]:=
$$\text{Limit}\left[\frac{(x+\Delta x)^4-x^4}{\Delta x},\ \Delta x\to 0\right]$$

Out[2]=
$$4x^3$$

W3-P2

In[3]:=
$$D\left[x^3,\ x\right]$$

Out[3]=
$$3x^2$$

In[4]:=
$$D\left[x^{5/4},\ x\right]$$

Out[4]=
$$\frac{5x^{1/4}}{4}$$

In[5]:=
$$D\left[x^{1/3},\ x\right]$$

Out[5]=
$$\frac{1}{3x^{2/3}}$$

In[6]:=
$$D\left[1-2x+3x^2-4x^3+5\,\text{Sin}[x]-6\,\text{Cos}[x]+7\,\text{Exp}[x]-8\,\text{Log}[x],\ x\right]$$

Out[6]=
$$-2+7e^x-\frac{8}{x}+6x-12x^2+5\,\text{Cos}[x]+6\,\text{Sin}[x]$$

W3-P3

In[7]:=
$$D\left[\frac{n\,R\,T}{V}\left(1-\frac{n\,B}{V}\right),\ V\right]$$

Out[7]=
$$\frac{B\,n^2\,R\,T}{V^3}-\frac{n\,R\,T\left(1-\frac{B\,n}{V}\right)}{V^2}$$

W3-P4

In[8]:=
$$D\left[\left(1-4x^2\right)\text{Cos}[x],\ x\right]$$

Out[8]=
$$-8x\,\text{Cos}[x]-\left(1-4x^2\right)\text{Sin}[x]$$

In[9]:=
$$D\left[\left(2+3x\right)\text{Exp}[x],\ x\right]$$

Out[9]=
$$3e^x+e^x\left(2+3x\right)$$

In[10]:=
$$D[\text{Exp}[x]\,\text{Cos}[x],\ x]$$

Out[10]=
$$e^x\,\text{Cos}[x]-e^x\,\text{Sin}[x]$$

In[11]:=
$$D[x\,\text{Log}[x],\ x]$$

Out[11]=
$$1+\text{Log}[x]$$

In[12]:= `D[(1 + x)^5, x]`

Out[12]= $5\ (1+x)^4$

In[13]:= `D[Sqrt[2 + x^2], x]`

Out[13]= $\frac{x}{\sqrt{2+x^2}}$

In[14]:= `D[Exp[-2 x], x]`

Out[14]= $-2\ e^{-2x}$

In[15]:= `D[Cos[2 x^2 - 3 x + 1], x]`

Out[15]= $-(-3+4x)\ \text{Sin}[1-3x+2x^2]$

In[16]:= `D[Exp[Sin[x]], x]`

Out[16]= $e^{\text{Sin}[x]}\ \text{Cos}[x]$

In[17]:= `D[Log[(2 + x)/(3 - x)], x]`

Out[17]= $\frac{(3-x)\left(\frac{1}{3-x}+\frac{2+x}{(3-x)^2}\right)}{2+x}$

In[18]:= `D[Log[Sin[2 x] + Sin[x]^2], x]`

Out[18]= $\frac{2\,\text{Cos}[2x]+2\,\text{Cos}[x]\,\text{Sin}[x]}{\text{Sin}[x]^2+\text{Sin}[2x]}$

In[19]:= `D[Tan[4 x] Cos[2 x]^2, x]`

Out[19]= $4\,\text{Cos}[2x]^2\,\text{Sec}[4x]^2-4\,\text{Cos}[2x]\,\text{Sin}[2x]\,\text{Tan}[4x]$

In[20]:= `D[x^2 Exp[2 x^2 + 3], x]`

Out[20]= $2\,e^{3+2x^2}\,x+4\,e^{3+2x^2}\,x^3$

W3-P5

In[21]:= `D[2 x^2 - y^2, x]`

Out[21]= $4x$

In[22]:= `D[2 x^2 - y^2, y]`

Out[22]= $-2y$

In[23]:= `D[Sin[x^2 - y^2], x]`

Out[23]= $2x\,\text{Cos}[x^2-y^2]$

In[24]:= `D[Sin[x^2 - y^2], y]`

Out[24]= $-2y\,\text{Cos}[x^2-y^2]$

W3-P6a

In[25]:=
```
D[x^2 - 3 x^2 y + 4 x y^2, x]
D[x^2 - 3 x^2 y + 4 x y^2, y]
```

Out[25]= $2\,x - 6\,x\,y + 4\,y^2$

Out[26]= $-3\,x^2 + 8\,x\,y$

In[27]:=
```
D[x^2 - 3 x^2 y + 4 x y^2, x, x]
D[x^2 - 3 x^2 y + 4 x y^2, x, y]
D[x^2 - 3 x^2 y + 4 x y^2, y, y]
```

Out[27]= $2 - 6\,y$

Out[28]= $-6\,x + 8\,y$

Out[29]= $8\,x$

In[30]:=
```
D[x^2 - 3 x^2 y + 4 x y^2, x, x, y]
D[x^2 - 3 x^2 y + 4 x y^2, x, y, y]
```

Out[30]= -6

Out[31]= 8

W3-P6b

In[32]:=
```
D[3 x^2 + y^2 + 2 x y^3, x]
D[3 x^2 + y^2 + 2 x y^3, y]
```

Out[32]= $6\,x + 2\,y^3$

Out[33]= $2\,y + 6\,x\,y^2$

In[34]:=
```
D[3 x^2 + y^2 + 2 x y^3, x, x]
D[3 x^2 + y^2 + 2 x y^3, x, y]
D[3 x^2 + y^2 + 2 x y^3, y, y]
```

Out[34]= 6

Out[35]= $6\,y^2$

Out[36]= $2 + 12\,x\,y$

In[37]:=
```
D[3 x^2 + y^2 + 2 x y^3, x, y, y]
D[3 x^2 + y^2 + 2 x y^3, y, y, y]
```

Out[37]= $12\,y$

Out[38]= $12\,x$

In[39]:=
```
D[3 x^2 + y^2 + 2 x y^3, x, y, y, y]
```

Out[39]= 12

W3-P7

In[40]:=
```
D[2 x^2 y + Cos[x + y], x]
D[2 x^2 y + Cos[x + y], y]
```

Out[40]= $4\,x\,y - \text{Sin}[x + y]$

Out[41]= $2\,x^2 - \text{Sin}[x + y]$

In[42]:=
```
D[2 x^2 y + Cos[x + y], x, x]
D[2 x^2 y + Cos[x + y], x, y]
D[2 x^2 y + Cos[x + y], y, y]
```

Out[42]= $4\,y - \text{Cos}[x + y]$

Out[43]= $4\,x - \text{Cos}[x + y]$

Out[44]= $-\text{Cos}[x + y]$

W3-P8

In[45]:=
```
D[x^3 - 3 x^2 y + y^3, x, y]
D[x^3 - 3 x^2 y + y^3, y, x]
```

Out[45]= $-6\,x$

Out[46]= $-6\,x$

In[47]:=
```
D[x^2 Cos[y - x], x, y]
D[x^2 Cos[y - x], y, x]
```

Out[47]= $x^2\,\text{Cos}[x - y] + 2\,x\,\text{Sin}[x - y]$

Out[48]= $x^2\,\text{Cos}[x - y] + 2\,x\,\text{Sin}[x - y]$

W3-P9

In[49]:=
```
D[Cos[x + 2 y + 3 z], x, y, z]
D[Cos[x + 2 y + 3 z], y, z, x]
D[Cos[x + 2 y + 3 z], z, x, y]
```

Out[49]= $6\,\text{Sin}[x + 2\,y + 3\,z]$

Out[50]= $6\,\text{Sin}[x + 2\,y + 3\,z]$

Out[51]= $6\,\text{Sin}[x + 2\,y + 3\,z]$

W3-P10

In[52]:=
```
D[f[x - c t] + g[x + c t], x, x]
1/c^2 D[f[x - c t] + g[x + c t], t, t] // Simplify
```

Out[52]= $f''[-c\,t + x] + g''[c\,t + x]$

Out[53]= $f''[-c\,t + x] + g''[c\,t + x]$