

```
{
  "nbformat": 4,
  "nbformat_minor": 0,
  "metadata": {
    "colab": {
      "provenance": [],
      "collapsed_sections": []
    },
    "kernelspec": {
      "name": "python3",
      "display_name": "Python 3"
    },
    "language_info": {
      "name": "python"
    }
  },
  "cells": [
    {
      "cell_type": "markdown",
      "source": [
        "Team ID : PNT2022TMID23122"
      ],
      "metadata": {
        "id": "J48UYzjdyvOj"
      }
    },
    {
      "cell_type": "markdown",
      "source": [
        "***Performance Analysis (sprint-3)***"
      ],
      "metadata": {
        "id": "MPN4VGMp_NYr"
      }
    }
  ]
}
```

```
,
{
  "cell_type": "markdown",
  "source": [
    "(i).Performance Analysis"
  ],
  "metadata": {
    "id": "T9cEpCO4_XCY"
  }
},
{
  "cell_type": "code",
  "source": [
    "metrics = pd.DataFrame(model.history.history)"
  ],
  "metadata": {
    "id": "wPwuJSMX-PFw"
  },
  "execution_count": 43,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "metrics"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/",
      "height": 520
    },
    "id": "GVl0Es3M3rGt",
    "outputId": "13841f7e-2ce1-430e-c6c3-25c651dfdb3c"
  },
}
```

```

"execution_count": 28,
"outputs": [
  {
    "output_type": "execute_result",
    "data": {
      "text/plain": [
        "   loss accuracy val_loss val_accuracy\n",
        "0  2.204523  0.317883  2.080388    0.5615\n",
        "1  1.938731  0.660933  1.770403    0.7467\n",
        "2  1.609755  0.760000  1.423116    0.7956\n",
        "3  1.283058  0.789517  1.116987    0.8168\n",
        "4  1.021336  0.810200  0.891695    0.8334\n",
        "5  0.837351  0.825583  0.740864    0.8465\n",
        "6  0.714310  0.838500  0.639969    0.8572\n",
        "7  0.630683  0.849867  0.570973    0.8668\n",
        "8  0.571758  0.858650  0.521652    0.8742\n",
        "9  0.528109  0.865400  0.484234    0.8806\n",
        "10 0.494684  0.871100  0.455319    0.8856\n",
        "11 0.468315  0.875900  0.432311    0.8901\n",
        "12 0.446845  0.879833  0.413490    0.8930\n",
        "13 0.429000  0.883817  0.397645    0.8955\n",
        "14 0.413854  0.886983  0.384456    0.8983"
      ],
      "text/html": [
        "\n",
        " <div id=\"df-8121c014-4d59-467c-8b01-e882aada1855\">\n",
        "   <div class=\"colab-df-container\">\n",
        "     <div>\n",
        "       <style scoped>\n",
        "         .dataframe tbody tr th:only-of-type {\n",
        "           vertical-align: middle;\n",
        "         }\n",
        "       \n",
        "     .dataframe tbody tr th {\n",

```

```

"    vertical-align: top;\n",
"  }\n",
"\n",
"  .dataframe thead th {\n",
"    text-align: right;\n",
"  }\n",
"</style>\n",
"<table border=\"1\" class=\"dataframe\">\n",
"  <thead>\n",
"    <tr style=\"text-align: right;\">\n",
"      <th></th>\n",
"      <th>loss</th>\n",
"      <th>accuracy</th>\n",
"      <th>val_loss</th>\n",
"      <th>val_accuracy</th>\n",
"    </tr>\n",
"  </thead>\n",
"  <tbody>\n",
"    <tr>\n",
"      <th>0</th>\n",
"      <td>2.204523</td>\n",
"      <td>0.317883</td>\n",
"      <td>2.080388</td>\n",
"      <td>0.5615</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>1</th>\n",
"      <td>1.938731</td>\n",
"      <td>0.660933</td>\n",
"      <td>1.770403</td>\n",
"      <td>0.7467</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>2</th>\n",

```

```
"    <td>1.609755</td>\n",
"    <td>0.760000</td>\n",
"    <td>1.423116</td>\n",
"    <td>0.7956</td>\n",
"  </tr>\n",
"  <tr>\n",
"    <th>3</th>\n",
"    <td>1.283058</td>\n",
"    <td>0.789517</td>\n",
"    <td>1.116987</td>\n",
"    <td>0.8168</td>\n",
"  </tr>\n",
"  <tr>\n",
"    <th>4</th>\n",
"    <td>1.021336</td>\n",
"    <td>0.810200</td>\n",
"    <td>0.891695</td>\n",
"    <td>0.8334</td>\n",
"  </tr>\n",
"  <tr>\n",
"    <th>5</th>\n",
"    <td>0.837351</td>\n",
"    <td>0.825583</td>\n",
"    <td>0.740864</td>\n",
"    <td>0.8465</td>\n",
"  </tr>\n",
"  <tr>\n",
"    <th>6</th>\n",
"    <td>0.714310</td>\n",
"    <td>0.838500</td>\n",
"    <td>0.639969</td>\n",
"    <td>0.8572</td>\n",
"  </tr>\n",
"  <tr>\n",
```

```
" <th>7</th>\n",
" <td>0.630683</td>\n",
" <td>0.849867</td>\n",
" <td>0.570973</td>\n",
" <td>0.8668</td>\n",
" </tr>\n",
" <tr>\n",
" <th>8</th>\n",
" <td>0.571758</td>\n",
" <td>0.858650</td>\n",
" <td>0.521652</td>\n",
" <td>0.8742</td>\n",
" </tr>\n",
" <tr>\n",
" <th>9</th>\n",
" <td>0.528109</td>\n",
" <td>0.865400</td>\n",
" <td>0.484234</td>\n",
" <td>0.8806</td>\n",
" </tr>\n",
" <tr>\n",
" <th>10</th>\n",
" <td>0.494684</td>\n",
" <td>0.871100</td>\n",
" <td>0.455319</td>\n",
" <td>0.8856</td>\n",
" </tr>\n",
" <tr>\n",
" <th>11</th>\n",
" <td>0.468315</td>\n",
" <td>0.875900</td>\n",
" <td>0.432311</td>\n",
" <td>0.8901</td>\n",
" </tr>\n",
```

```

" <tr>\n",
" <th>12</th>\n",
" <td>0.446845</td>\n",
" <td>0.879833</td>\n",
" <td>0.413490</td>\n",
" <td>0.8930</td>\n",
" </tr>\n",
" <tr>\n",
" <th>13</th>\n",
" <td>0.429000</td>\n",
" <td>0.883817</td>\n",
" <td>0.397645</td>\n",
" <td>0.8955</td>\n",
" </tr>\n",
" <tr>\n",
" <th>14</th>\n",
" <td>0.413854</td>\n",
" <td>0.886983</td>\n",
" <td>0.384456</td>\n",
" <td>0.8983</td>\n",
" </tr>\n",
" </tbody>\n",
"</table>\n",
"</div>\n",
" <button class=\"colab-df-convert\" onclick=\"convertToInteractive('df-8121c014-4d59-467c-8b01-
e882aada1855')\">\n",
" title=\"Convert this dataframe to an interactive table.\">\n",
" style=\"display:none;\">\n",
" \n",
" <svg xmlns=\"http://www.w3.org/2000/svg\" height=\"24px\" viewBox=\"0 0 24 24\">\n",
" width=\"24px\">\n",
" <path d=\"M0 0h24v24H0V0z\" fill=\"none\"/>\n",
" <path d=\"M18.56 5.44l.94 2.06.94-2.06-.94-2.06-.94 2.06-.94 2.06.94zm-11 11l8.5
8.5l.94-2.06.94-2.06-.94-2.06-.94 2.06-.94 2.06.94zm10 10l.94 2.06.94-2.06-.94-2.06-.94
2.06-2.06.94z\"/><path d=\"M17.41 7.96l-1.37-1.37c-.4-.4-.92-.59-1.43-.59-.52 0-1.04.2-1.43.59L10.3 9.45l-7.72

```

7.72c-78.78-78 2.05 0 2.83L4 21.41c.39.39.9.59 1.41.59.51 0 1.02-.2 1.41-.59l7.78-7.78 2.81-2.81c.8-.78.8-2.07 0-2.86zM5.41 20L4 18.59l7.72-7.72 1.47 1.35L5.41 20z\"/>\n",

" </svg>\n",

" </button>\n",

" \n",

" <style>\n",

" .colab-df-container {\n",

" display:flex;\n",

" flex-wrap:wrap;\n",

" gap: 12px;\n",

" }\n",

"\n",

" .colab-df-convert {\n",

" background-color: #E8F0FE;\n",

" border: none;\n",

" border-radius: 50%;\n",

" cursor: pointer;\n",

" display: none;\n",

" fill: #1967D2;\n",

" height: 32px;\n",

" padding: 0 0 0 0;\n",

" width: 32px;\n",

" }\n",

"\n",

" .colab-df-convert:hover {\n",

" background-color: #E2EBFA;\n",

" box-shadow: 0px 1px 2px rgba(60, 64, 67, 0.3), 0px 1px 3px 1px rgba(60, 64, 67, 0.15);\n",

" fill: #174EA6;\n",

" }\n",

"\n",

" [theme=dark] .colab-df-convert {\n",

" background-color: #3B4455;\n",

" fill: #D2E3FC;\n",

" }\n",


```

"\n",
" [theme=dark] .colab-df-convert:hover {\n",
"   background-color: #434B5C;\n",
"   box-shadow: 0px 1px 3px 1px rgba(0, 0, 0, 0.15);\n",
"   filter: drop-shadow(0px 1px 2px rgba(0, 0, 0, 0.3));\n",
"   fill: #FFFFFF;\n",
" }\n",
" </style>\n",
"\n",
"   <script>\n",
"     const buttonEl =\n",
"       document.querySelector('#df-8121c014-4d59-467c-8b01-e882aada1855 button.colab-df-convert');\n",
"     buttonEl.style.display =\n",
"       google.colab.kernel.accessAllowed ? 'block' : 'none';\n",
"\n",
"     async function convertToInteractive(key) {\n",
"       const element = document.querySelector('#df-8121c014-4d59-467c-8b01-e882aada1855');\n",
"       const dataTable =\n",
"         await google.colab.kernel.invokeFunction('convertToInteractive',\n",
"           [key], {});\n",
"       if (!dataTable) return;\n",
"\n",
"       const docLinkHtml = 'Like what you see? Visit the ' +\n",
"         '<a target=\"_blank\" href=https://colab.research.google.com/notebooks/data_table.ipynb>data table notebook</a>'\n",
"         + ' to learn more about interactive tables.';\n",
"       element.innerHTML = \"\n",
"         dataTable['output_type'] = 'display_data';\n",
"         await google.colab.output.renderOutput(dataTable, element);\n",
"         const docLink = document.createElement('div');\n",
"         docLink.innerHTML = docLinkHtml;\n",
"         element.appendChild(docLink);\n",
"       }\n",
"     </script>\n",

```

```

    " </div>\n",
    " </div>\n",
    " "

]
},
"metadata": {},
"execution_count": 28
}
]
},
{
  "cell_type": "code",
  "source": [
    "metrics.plot()"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/",
      "height": 282
    },
    "id": "_UVB2Cpv3pDP",
    "outputId": "4331c5d7-00ca-48ae-ec3e-4b345cd476cc"
  },
  "execution_count": 29,
  "outputs": [
    {
      "output_type": "execute_result",
      "data": {
        "text/plain": [
          "<matplotlib.axes._subplots.AxesSubplot at 0x7f8847c5f190>"
        ]
      },
      "metadata": {},
      "execution_count": 29
    }
  ]
}

```

```
},
{
  "output_type": "display_data",
  "data": {
    "text/plain": [
      "<Figure size 432x288 with 1 Axes>"
    ],
    "image/png":
      "iVBORw0KGgoAAAANSUhEUgAAAXoAAAD4CAYAAADiry33AAAAABHNCSVQICAgIfAhkiAAAAAlwSFlzAAALEgAACxIB
      0t1+/AAAADh0RVh0U29mdHdhcmUAAbWF0cGxwdGxpYiB2ZXJzaW9uMy4yLjlsIGh0dHA6Ly9tYXRwbG90bGliLm9yZ
      y+WH4yJAAAgAEIEQVR4nOzdd3hUxfrA8e9sSTa9kUYKRT0JCST0DoLgRbkWRBQFLIAoeq0oRRcW/Lyo2AUL6FURFLli
      uaglinSTAAk19CS09Ebq7s7vj11CQJLdQHrm8zznOXvmzOy+CfDuYc6cGSGIRFEURWm8NHUdgKloilKzVKJXFEVp5FSi
      VxRFaeRUolcURWnkVKJXFEVp5HR1HcCVNGvWTLZs2bKuw1AURWkwYmNj06WUvlc6Vy8TfcuWLYmJianrMBRFUR
      oMlctJis7Z7LoRQoQIITYKIfYLiFYJIR67Qp27hRDxQogElcRWIUREuXMnrOW7hRAqeyuKotQye67ojcCTUso4IYQbECu
      E+FVKub9cnePAQCIIIhBiJLAU6Fnu/GApZXr1ha0oiqLYy2ail1KeAc5YX+cJIQ4AQcD+cnW2lmuyHQiu5JgVRVGUq1SIP
      nohREugK7Cjkmr3A/8rdyyBX4QQElgipVxawXtPBiYDhlaGViUsRVFqUGlpKSkpKRQVFdV1KApgMBglDg5Gr9fb3cbuR
      C+EcAVWA/+SUuZWUGcwlkTfr1xxPynIKSGEH/CrEOKglHLT5W2tXwBLAaKjo9UEIpST6SkpODm5kblI0RQtR1OE2al
      JKMjAxSUIJo1aqV3e3sGkcvhNBjSfJfSCm/raBOF+AjYLSUMqNcYKes+1RgDdDD7ugURalzRUVF+Pj4qCRfDwgh8PHxqf
      L/ruwZdSOAJ4EDUusrXK6gTCnwL3COITCxx7mK9gYsQwgUYDuytUoSKotQ5leTrj6v5s7Cn66YvcA+QIITYbs2bCYQCSC
      k/AJ4HfId3rEEYpZTRgD+wxlqmA76UUq6rcpR2MJsI7/9xIAftfQkP9qij1AURWmQ7Bl1sxmo9CTESvka8MAVyo8BEX
      9vUf3yiox8uSOJFTuT+P6Rfni5ONTGxyqKUgtcXV3Jz8+v6zAarEYz142Hs5737u5Gam4xj63cjcms7ucqiqJAI0rOABEHns
      y7uTOBEtN487fDdR2OoijVTErJ008/TVhYGOHh4axcuRKAM2fOMGDAACIjIwKLC+PPP//EZDIxcelEsprvvPFGHUdfdr
      IXDfXYlyPEHYIZfHWb4eJCPZgaEf/ug5JURqNF77fx/7TVxxdfdU6NXdn7k2d7ar77bfsnv3bvbs2UN6ejrdu3dnwIABfPn
      II9xwww3MmjULk8IEQUEBu3fv5tSpU+zdaxn/kZ2dXa1xNySN6ooeLHekF/wzjM7N3Xl85W5OZpyv65AURakmmzdv
      Zty4cWi1Wvz9/Rk4cCB//fUX3bt3Z9myZcybN4+EhATc3Nxo3bo1x44dY/r06axbtw53d/e6Dr/ONLoregCDXssH46MY
      9fZmpn4ex7cP9cHJQVvXYSIKg2fvlXdtGzBgAJs2beLHH39k4sSJPPHEE9x7773s2bOHn3/+mQ8++IBVq1bxySef1HWod
      aLRXdFFeOLTz0I7Izl4NpdZ/01ASnVzVIEauv79+7Ny5UpMJhNpaWls2rSJHj16cPLKSfz9/XnwwQd54IEHiluLiz09HbPZz
      G233cbChQuji4ur6/DrTKO8or9gcHs/HhvalsXrD9Mt1lvxvVrUdUiKolyDW265hW3bthEREYEQldffZWAgAA+/fRT/v3
      vf6PX63F1deWzzz7j1KITTJo0CbPZDMDLL79cx9HXHVEfr3Sjo6NldS08YjZL7v/OLzYfSWfVIN50DfWqlvdVIKbiwIEDdOz
      Ysa7DUMq50p+JECLW+qDq3zTarpsLNBrBG2MjCfAwMO2LONLzi+s6JEVRIFrV6BM9gKezA+/fHUXm+RKmf7kLo8lc1
      yEpiqLUmiaR6AHCgjx48ZZwth3LYNEvibYbKlqiNBKNJtGbZCaW7V1GQlpChXVujwrm7p6hfPDHudbtPVOL0SmKotSd
      RpPoC42FfHHgC2ZvmU2xqeJ++Odv6kREiCdPfR3P0TQ1SZKiKl1fo0n0rg6uvNDnBY7IHO093e9VWM9Rp+W9u7vho
      NPw0OexnC821mKUIqlota/RJHqAvkF9ua3tbSzt5z4tPgK6wV5OvH2uK4cSc1nxup49TCVoiinNWqNK9ABPRT+Fn7Ofz
      S6cvm2a8dQN7fkh/gzLtpyovQAVRam3jMbG+T/8RpfoL3ThHM85zru73q207kMDr2N4J39e+ukAO49n1lKEiqJcX/+8
      59ERUXRuXNnli5dCsC6devo1q0bERERDB06FID8/HwmTZpEeHg4Xbp0YfXq1YBl8ZlLvnmGyZOnAjAxIkTmTp1Kj179
      uSZZ55h586d907dm65du9KnTx8OHToEgMlk4qmnniLSlwXbrw9ttvs2HDBv75z3+Wve+vv/7KLbfcUhu/jipplFMg9
      Gneh9vb3c7yfcsZEjQESL/IK9YTQrDojghGv7OFh7+M48fp/fBzN9RytlrSgPzvWThb8ci2qxIQDiNfsVntk08+wdvbm8LC
      Qrp37870a0AN58MEH2bRpE61atSlz03KxtmDBAjw8PEhIsMSZlZVl871TUlYunUrWq2W3Nxc/vzzT3Q6HevXr2fzmJm
      sXr2apUuXcuLECBxbv3o1OpyMzMxMvLy+mTztGWloavr6+LFu2jPvuU+/afh81wJ7FwUOEeBuFEPuFEPuEEI9doY4QQ
      rwlhDgihlgXQnQrd26CEOKwdZtQ3T9ARZ6KfopAl0DmbJlDkbHiFdPdDXreH9+N/CljD38Zr6l6mEpR6qW33nqLiIglev
      XqRXJyMkuXLMxAgAG0atUKAG9vbWdWr1/Pww8/XNbOy8v2tCdjxoxBq7XMcJuTk8OYMWMICwvj8ccfZ9++fWXvO
      2XKFHQ6XdnnCSG45557+Pzzz8nOzmbbtm2MHDmyWn/u6mDPFb0ReFJKGSeEcANihRC/Sin3l6szEmhr3XoC7wM9
      hRDewFwgGpDWtmullLa/Yq+Ri96FF/q+wLO/PMg7u97hqe5PVVi3Q4A7r9wWzmNf7ebInw7y/E2dajo8RWmY7Ljyr
      gm///4769evZ9u2bTg7OzNo0CAilyM5ePCg3e8hxMWlr4uKlR34c3FxKXs9Z84cBg8ezJo1azhx4gSDBg2q9H0nTZrETT
      fdhMFgYMyYMWWfBPWJzSt6KeUZKWWc9XUecAAUqzaaOAZabEd8BRCBAI3AL9KKTOtyf1XYES1/gSV6BXYizva3cFn
      +z9jV+quSuuOjgxiYp+WfLLIOGv3nK6lCBVFsUdOTG5eXl44Ozt8OBBtm/ftIFREZs2beL48eMAZV03w4YN4913L96fu
      9B14+/vz4EDBzCbzaxZs6bSzwKsqS45cuXl5UPGzaMJUuWIN2wvfb5zZs3p3nz5ixcuJBjkyZV3w9djap0M1YI0RLoCuy
      47FQQkFzuOMVaVlH5ld57shAiRggRk5aWVpWwKvVE9BM0d23OnC1zKDQWVlp35o0diW7hxbOr40k81dtMSiKcm
      1GjBiB0WikiY8eOPPvss/Tq1QtFX1+WLI3KrbfeSkREBGPJhgVg9uzZZGVIERYWRkREBBs3bgTglVdeYdSoUfTp04fAwM
```

AKP+uZZ57hueeeo2vXrpeMwnnggQclDQ2IS5cuRERE8OWXX5adu/vuuwkJCam3s3zaPU2xEMIV+AN4UUr57WXnfg
BekVJuth7/BswABgEGKeVCa/kcoFBKuaiyz6rOaYoBdp7Zyf2/3M89ne7hme7PVFr3XG4R/3hrM+4GHd890hc3g77a4l
CUhkhNU2zbi488QteuXbn//vtr5fNqZJpiYQeWA18cXmStzoFhJQ7DraWVvReq3oE9mBs+7F8vv9zYs/FVlrx393Au3d
15WRmAU99vUc9TKUoSqWioqKlj49n/PjxdR1KhewZdSOAJ4EDUusrXK6i2FrjXOvqmF5AjPtwD/AwMF0J4CSG8gOH
Wslr3RJSIC+f5Lc/b7MLp2dqH50Z24Od951iy6VgtRagoSkMUGxvLpk2bcHR0rOtQKmTPFX1f4B5giBBit3W7UQgxVQg
x1VrnJ+AYcAT4EJgGIKXMBBYAf1m3+dayWuesd2ZB3wUk5SxxVtxbNuvf368V/wgP5NV1B9l6JL0WIIQURakZNscBWf
vdhY06Eni4gnOfAPVi6fXuAd0Z12Ecnx/4nKGhQ4kOuGJ3FmAZivV/t3fh0Lk8pq/YxU+P9cdfPUyIKeoD1OimQLDIX93
+RbBrMHO2zKGGtKDSuq6OOj4YH0V+sZG53+2rpQgVRVGqV5NL9Be6cFLyU3gz7k2b9dv4ufLY9W1Zt+8sv+w7Wws
RKoqiVK8ml+gBogOiubvj3Xx58Ev+OvuXzfoP9m9NhwA3nv9uH3IFpbUQoaloSvVpkoke4NGujxLqFmpXF45eq+GIW8
M5l1fEa2q9WUWp98rPVHm5EydOEBYVWovR1L0mm+gvdOGczj/N67EVjRq9qFuoF/f0asGn206wOzm75gNUFEWp
JvVv9p1a1M2/G3d3vJvPD3zOsBbD6BnYs9L6T9/Qnl/2nePZ1f8P70fem2T/Z5Umqj/2/l/HMy0fylxe3Tw7sCMHjMqr
fPss88SEhJSNivlvHnz0O10bNy4kaysLEpLS1m4cCGjR4+u0mcXFRXx0EMPERMTg06n4/XXX2fw4MHs27ePSZMmUVJS
gtlsZvXq1TRv3pw77riDIJQUTCYTc+bMKZt2ob5r8pnq0W6P0sK9BXO3zuV86fIK67oZ9My7uTMHz+bx8ebjtrShoihix
45l1apVZcerVq1iwoQJrFmzhri4ODZu3MiTTz5Z5SfZ3333XYQJQCQksGLFCiZMmEBRUREffPABjz32GLt37yYmJobg4G
DWrVtH8+bN2bNnD3v37mXEiFqbn/GaNekregAnnRML+i5gww8m8HrM68zpPafS+iPCAjhjeyZ/F6xO5MSyQUB/nWo
pUueqerSvmtK1a1dSU1M5ffo0aWlpeHI5ERAQwOOPP86mTZvQaDScOnWKc+fOERAQYPf7bt68menTpwpQoUM
HWrRoQWJilr179+bFF18kJSWFW2+9lbZt2xleHs6TTz7JjBkzGDVqFP3796+pH7faNfkreoCufI25p9M9rEpcxfYz223Wf
2F0Z3QaDbP+m6DmwlgUWjJmzBi++eYbVq5cydixY/niiy9IS0sjNjaW3bt34+/v/7d55q/WXXfdxdq1a3FycuLGG29kw
4YntGvXjri4OMLDw5k9ezbz58+vls+qDSrRW03vOp2W7i15fsvz5JfkV1o30MOJp29oz5+H09Xc9YpSS8aOHctXX33FN
998w5gxY8jJycHPzw+9Xs/GjRs5efJkld+zf//+pHFFwAkJiaSIJRE+/btOXbsGK1bt+bRRx9I9OjRxMfHc/r0aZydnRk/fjxP
P/00cXfx1f0j1hiV6K0MOgML+i7gXME5Xot9zWb98b1aEBniyfvz95NdUFILESpK09a5c2fy8vIICgoiMDCQu+++m5iYG
MLDw/nss8/oOKFDld9z2rRpmM1mwsPDGtT2LMuXL8fR0ZfVq1YRFhZGZGQke/fu5d577yUhiYEEpXoQGRnJCy+8w
OzZs2vgp6wZds9HX5uqez76qngt5jWW71vOkmFL6NO8T6V1D5zJ5aa3N3NrtYBevT2iljUINql5qOvf2pkPvqm5OHlh
2nl0Yq5W+fa7MLpGOjOA/1bsyomhW1HM2opQkVRlKpRif4yBp2BhX0XklqQyqKYShfCAuCxoW0J9XZm1poEikpNtR
Choi2SEHIIDly8pKtZ8/Kn5VprFSiv4Iuvl2Y0HkCqw+vZsupLZXWdXLQ8ultYRXLp897G4/UUoSKotgSHh7O7t27L9I27L
h8ueumQsX6Cjwc+TctPVozd+tc8koqXyi8f1tfbukaxPt/HOWwwlRcUZr6RiX6CjhqHVnYdyFphWn8+69/26w/+x8dc
XHU8dy3CZjN9e8Gt6IoTZc9a8Z+loRIFULsreD80+WWGNwrhDAJlbyt504IIRKs5+pmGM01CPcNZ1LnSaw5soatp7dW
WtfH1ZFZN3Yk5mQWX/2VXEsRkoqi2GbPff1yoMJJHaSU/5ZSRkop14HngD8uWxd2sPV8xev21WMPRT5EqFsol+94
mVJT5XPR3x4VTO/WPrz8vwOk5lbPE3qKoiJXymail1JuAuxd0HscOKalqpnHLWOPNvjWU7knuCz/Z9VWlclwYu3hFF
sNPPCD/trKUJFUS5X2Xz0TVG19dELIZyxXPmvLlcsGv+EELFCiMk22k8WQsQIIWLS0tKqK6xq0T+4P4NDBrMkfglnz1e+
nGBrX1emD27Dj/Fn2HDwXC1FqChKfWQ0Gus6BK6Z6+8CdhyWbdNPynIKSGEH/CreOKg9X8IfyOIXAosBcuTsdUYV
7WY0WMGo/87mkUxi1g0sPlx9VMGXsfaPaeZ89999HzcBxfHj9JqNJlNH3pJYoPVO98914dOxAwc2aldapzPvr8/HxGj
x59xXaffYzixYtQghBly5d+M9//sO5c+eYOnUqx44dA+D999+nefPmjBo1ir17LbcuFy1aRH5+PvPmzWPQoEFERkayef
Nmxo0Br7t27Vi4CElJSX4+PjwxRdf4O/vT35+PtOnTycmJgYhBHPnziUnJ4f4+HgWL14Mwlcffsj+/ft54403rvr3C9U76
uZOLuu2kVKesu5TgTVAj2r8vFoV5BrE/eH38/OJn23OcOmg0/DyreGcyi7kjV/V0oOKcq2qcz56g8FwxXb79u1j4cKfBni
wgT179vDmm28C8OijjzJw4ED27NIDXFwcnTt3tvkZJSUlXMTES0STT9KvXz+2b9/Orl27uPPO03n11VcBWLbgAR4eHi
QkJBAfH8+QIUO44447+P777ykttdwPXLZsGffdd9/V/MouUS2XmkIID2AgML5cmQugkVlMwV8PBxrOvJ5Xcf/Yfaw9
spaXd7zMNzd9g16rr7BudEtv7u4ZyidbjjM6MojwYI9ajFRRaoatK++aUp3z0UspmTlz5t/abdiwgTFjxtCsWTMAvL29Ad
iwYQOffWa5P6fVavHw8CArK6vSzyi/8IRKSgpjx47lJkzJJSU0kPKWdWR1/PV199VVbPy8sLgCFDhvdDDZ/QsWNHskt
LCQ8Pr+Jv6+/sGV65AtgGtBdCpAgh7hdCTBVCTC1X7RbgFyll+SWa/IHNQog9wE7gRynlumOuA45ah2Z0WMGx3KO
8cWBL2zWf2ZEB3xcHXluTTxGk7kWIISUxqu65qOvjnnsdTodZvPFf9OXt3dxcSI7PX36dB555BESEhJYsmSJzc964IEHW
L58OcuWLWPSpElViqsi9oy6GSelDJRS6qWUwVLKj6WUHU0gpPyhXZ7mU8s7L2h2TUKZYt85SyherJel6NihkEAOCB/D+
nvdJLUittK6Hk555N3Vm76lclm89UTsBKkojVV3z0VfUbsiQIXz99ddkZFgmKMzMtNxuHDP0KO+//z4AJpOJnJwc/P39S
U1NJSmjg+LiYn744YdKPy8oKAIAtz/9tKx82LBhvPvuU2XHF/6X0LNNt5KTK/nyyy8ZN26cvb+eSqknY6/Cs92fxWg22jX
p2Y3hAQzt4MdrvYSSklVQC9EpSuNUxfPRV9Suc+fOzJo1i4EDBxIREcETTzwBwJtvvsngjRsJDw8nKiqK/fv3o9fref755+
nRowfDhg2r9LPnzZvHmDFjilqKKusWAp9ezZZWVmEhYURERHBxo0by87dccc903bt6w751qp+eivOju73mFJ/BI+u
eETugd0r7TuqexChr3+B71a+/DxhGiEELUUpaJcOzUffeObNwOuJz/+OE0HDr3ieTUffS25P/x+mrs056UdL1FqrvyJ2SB
PJ54c3p4NB1P5MeFMLUWoKEpDk52dTbt27XBycqowyV8NleivkpPOiWd6PMOR7COsOGD7YeCJfVoSHuTBvLX7yS
mo/ItBUZRR1xDno/f09CQxMZGvv/66Wt9XJfprMCRkCH2D+vLenvdIK6j8aV6tRvDyreFkFZTwyrqrqfeBEUWpafezitaW
xzkd/NX8WKtFfAyEEz/V4jhJTCa/Hvm6zfliQB/f1bcmKnUn8dcLe6YMuPw4ZDAYyMjlaZLjvbkSUZGRkYDAYqtROPZt/
jVq4t2Bi54l8mPAht7e7nSj/qErrPz6sHT8lnOW5bxP48dF+OOq0tRSpolyd4OBgUllSgG9zUDVVB0OB4ODgKrVr026q
QUFpAaO/G42bgxurRq1Cp6n8+3PjoVQmLfuLJ4a149GhbWspSkVRGjM16qaGOeudeab7MxzOOszKQytt1h/c3o+bl

przzoYjHE3Lr4UIFUVpylSirybXh15P78DevLPrHdIL023Wf35UJwx6jVp6UFGUGqcSfTURQVbCz+coMhWxOHaxzfq+bo
7M+kdHdh7PZFWMWnpQUZSaoxJ9NWrl0Yp7O93Ld0e/Y3fqbpv174gOoVdrb1766QCpeWrpQUVRaoZK9NVsSpcp
+Dv789KOIzCZTZXFULw0i3hFBnNvPC9WnpQUZSaoRJ9NXPWO/NU96c4kHmArxNtP93W2teVR4dYlh787YBaelBR
lOqnEn0NuKHDFdQM6Mlbu94is8j2g1GTB1xHe383Zv93L/nF9WONSUVRGg+V6GuAEIKZPWdSWFrIm3Fv2qzvoNPw
8m3hnM0tYtHPh2ohQkVRmhKV6Gtla8/WjO80nm8Pf0t8WrzN+t1Cvbi3Vws+3XaCXUmVL1OmKlPsfFysJfjIECJVCL
G3gvODhBA5Qojd1u35cudGCCEOCSGOCCGerc7AG4KpEVPxc/LjxR0v2rwxC/D0iA4EuBt47tsEstXSg4qiVBN7ruiXAY
Ns1PITShlp3eYDCCG0wLvASKATME4l0elagm1oXPQuPBn9JPsz9rP68Gqb9V0ddcwFhCbBs3ks3XSsFiJUfKUpsGfN2E
3A1Uy12AM4Yl07tgT4Chh9Fe/Tol1sNZJo/2je2vUW2UXZNusP6+TPjeEBvPnbYY6nn7dZX1EUxZbq6qPvLYTYI4T4nxC
is7UsCCj/yGeKteyKhBCThRAXQoiYxjRL3oUbs/kl+by5y/aNWYB5N3XGUadh5rcJampYRVGuWXUk+jighZQyAngb+O/
VvImUcqMUMlpKGe3r61sNYdUfbb3aMq7DOFYnmZf+j6b9f3cDTw3siPbjmXwdWxKLUSoKEpjdS2JXkqZK6XmT77+
CdALIZoBp4CQclWDrWVN0rTlaXgbvHlxx4uYpe0brXd2D6FHS29e/PEA6fnFtRchoiN1TUneiFEgBBCWF/3sL5nBvAX0
FYl0UoI4QDcCay91s9rqNwc3Hgy+kkS0hNyc3iNzfoajeClW8MpLDExX02PoCjKNbBneOUKYBvQXgiRloS4XwgxVQgx1
VrldmCvEGIP8BZwp7QwAo8APwMHgFVSStv9Fo3YqNaj6ObXjCvXi8kpzrFZv42fKw8PbsPaPafZeCi1FiJUfKUxUitM1b
JDmYe444c7GNNuDLN7zbZZv8Ro5h9v/UIBiYfHh+Ai6Na/VFRIL9TK0zVI+2923Nn+ztZdWgV+zNsd8k46DS8fGs4p7lL
ef3XxFlUFGUxkYl+jrwcNeH8TJ42X1jNrqlN+N7hbJsy3HiU2yPxVcURSIPJfo64O7gzlPRTxGfFs/n+z+3q80zlzrg6+bIs6v
V9AiKolSNSvR1ZFTrUQwMHshbu97iWi7t6Q7cDXpeuDmM/Wdy+Xjz8VqIUGUxkll+joihGBu77kYdAZmb56N0Wx7
HvoRYQHc0NmfxesTOZmhpkdQFMU+KtHXIV9nX2b3nE1CegLL9y23q80LN4eh12iYtWavmh5BURS7qERfx0a0GsHw
FsN5d/e7HMq0vehlgleBZ0Z2YPORdNbsarIPGiuKUgUq0dcDs3vNxt3BndlbZlNqKrvZ/+4eoUS18GLBD/vJUNMjKlPig
Or09YCXwYu5vedyMPMgS+KX2Kyv0QheUTWc/GljC388UAsRKorSkKlEX08MCR3CzdfdzEcJH9k1w2VbfzceGtSGNbtO
sSmx8UzrrChK9VOJvh6Z0WMGPk4+zNw8k2KT7S6ZaYUou07WvC7P+m0BBie1RO4qiNE0q0dcj7g7uzO8zn2M5x3h3
17s26xv0Wl6+JZzkzElEXH+4FiJUfKUUhUom+nukb1Jfb293O8n3L2ZW6y2b9nq19GNcjhl82H2fvKdszYiqK0vSoRF8PP
RX9FM1dmzN782wKSgts1n92ZEe8XRx49tt4jGp6BEVRLqMsfT3kondhQd8FJOUIsThusc36Hk56Xri5M3tP5bJ864ma
D1BRIAZFjfp6qntAd8Z3HM+KgyvYcWaHzfojwwK4vqMfr/2SSHKm7f8FKlrSdKhEX4892u1RWri3YM6W0eSX5FdaVw
jB/NFhaATMWB2PyaymR1AUxcKepQQ/EUKkCiH2VnD+biFEvBAiQqixVQgRUe7cCWv5biFE41wyqgY56Zy2Hch5wr
OsShmkc36zT2dmHtzZ7YezeDfP9ueTkFRlKbBniv65cCISs4fBwZKKcOBBCDSy84PIIJGvRTElVK5SL9lJnWexOrDq9mUs
slm/TuiQ7irZygf/HGUnxLO1EKEiqLUdzYTvZrY5EBZyfmtUsos6+F2lLiaYlOspkVOo41nG+ZtnWfXouJzb+pE11BPnvp6
D4nn8mohQkVR6rPq7qO/H/hfuWMJ/CKEiBVCTK6soRBishAiRggRk5amHukvz0HrwlV9XiSrKluXd75ss76jTssH46Nw
dtAx5T+x5BTanihNUZTGq9oSvRBiMJZEP6NccT8pZTdgJPCwEGJARE2lIEullNFsymhfX9/qCqvR6OTTicldJvPjsR9Zf3K9
zfr+7gbeH9+N5MwCnli5G7O6OasoTVa1JHohRPIODjKAACAASURBVbfgl2C0lDljQrmU8pR1nwqsAXpUx+c1VQ90eY
CO3h1ZsH0BmUUV9qaV6d7SmzmjOvHbwVTe2qCmSFCUpuqaE70Qlht4FrhHSPlYrtxFCOF24TUwHLjiyB3FPnqNnpf
6vUReSR4Lti2wa4Wpe3u34NZuQSxef5jfDpyrhSgVRalv7BleuQLYBrQXQqQlIe4XQkwVQky1Vnke8AHeu2wYpT+wW
QixB9gJ/CilXFcDP0OT0sarDY90fYT1Sev56fhPNusLixjPlnDCgtz518rdHE9Xa80qSImJ6uO6o9HR0TImRg27r4jJbGLCug
kczznOmtFr8HP2s9kmJauAm97eTDNXR/77cF9cHHW1EKmiKLVFCBFb0TB29WRsA6TVaFnYdyElphLmbZ1nVxdOsJc
zb4/rxtG0fJ7+Zo9aWfXrmhCV6Buolh4t+VfUv/jz1J/898h/7WrTr20zZozowE8JZ1my6VgNR6goSn2hEn0DNq7DOLo
HdOf//vo/TueftqvN5AGt+UeXQF5dd5A/D6vnFRSlKVCJvgHTCA0L+lpG3zy/5XnM0vZc9EIIXr2tC2393Ji+Ypea6VJRmg
CV6Bu4INcgnu7+NDvO7mDloZV2tXfX1LHkniHmZsnUz2MpKjXVCJSKotQllegbgdva3kbfoL68EfsGSblJdrVp2cyFN++
MZP+ZXGZ+m6BuzipKI6YSfSMghOCF3i+g0+iYvWU2JrN9v+hDOvjzr6Ht+HbXKT5VK1MpSqOIEn0j4e/iz3M9nmNX6i
4+3f+p3e2mD2nD9R39WfjjAXYetz2tgqloDY9K9l3lqNajGNZiGltF/Pliv/saqPRCF4fG0GotzPTvojlbE5RDUepKEptU4
m+ERFC8GK/F4n0i2TGnzPYdnqbXe3cDXqW3BNFYmJqZ/HUmxUN2cVpTFRib6Rcdl58faQt2nl0YrHNj5GQlqCXe3a
+ruxaEwEu5Ozmbd2fw1HqShKbVKJvhHycPRgyfVL8DZ4M+23aRzLtu8p2JHhgTw06DpW7Eziq532jd5RFKX+U4m+kfJ
19uXDYR+iFvom/zqZM/n2rR/71PD29G/bjOe/28eupCzbDRRFqfDUom/EQtxDWDJscQWIBUz+dbJdi5VoNYK37uyKn
7sjD30eR1pecS1EqihKTVKJvpFr792et4e+zZnz5i2fhrnS23PR+/l4sCSe6LlLizhkS/jKDXZnlpBUZT6SyX6JiDKP4rXBr7G
wcyDPLbhMUpMJTbbdG7uwSu3dmHH8Uxe/ulGLUSpKEpNUYm+iRgYMPAfFRew4+wOZmyaYdfTs//sGsSkvi35ZMtx
vtt9qhailVBSlJtiV6IUQnWghUoUQV1zzVVi8JYQ4loSIF0JOK3dughDisHWbUF2BK1V303U3MaP7DNYnrWfBdvWnJ15
Y0d6tvJmxup44lOyayFKRVGqm71X9MuBEZWcHwm0tW6TgfcBhBDewFygJ9ADmCuE8LraYJVrN77TeB4Mf5DVh1fz
ZtybNuvrtRreuasbPi6O3PXhDjYfTq+FKBVFqU52JXop5SagsiEbo4HPpMV2wFMIEQjCAPwqpcyUUmYBv1L5F4ZSC6Z3
nc6YdmP4eO/HfLrP9w4vm6OrH6oD8FeTkxctPM1u1JqIUfUapLdfXRBwHJ5Y5TrGUvlf+NEGKyECJGCBGTlqZWpQ
pJQghm9ZzF8BbDWRsZyK6lCAM8DKya2pvuLb15fOUe3vv9iJraWFEaiHpzM1ZKuVRKGS2ljPb19a3rcBo9rUbLy/1fpn
dgb+ZtnceGpA0227gb9Cy/rzs3RzTn1XWHeP67fZjMKtkrSn1XXYn+FBBS7jYWIzRuVIPOGgdWDx4MZ18OvH0H0/z1
9m/bLZx1GlZPDaSKQNb85/tJ3lrvClKPVedSX6tcC91tE3vYAcKeUZ4GdguBDCy3oTdri1TKknnPXOVdF0PYldgpm+YTo
HMg7YbKPRCJ4b2ZF5N3Xi1wPnuOvD7WSetz02X1GUUmHv8MoVwDagvRAiRQhxvxBiqhBiqrXKT8Ax4AjwITANQEq
ZCSwA/rJu861lSj3iafBkybAluDu4M3X9VE7mnrSr3cS+rXjvrm7sPZ3L7e9vJSIDLTsUKPWRql831KKjo2VMTExdh9HkH

M85zoT/TcBJ58Rnlz/D38XfrnYxJzK5/9MY9FrBsok9CA/2qOFIFUW5nBAiVkoZfaVz9eZmrFL3Wnm04v1h75NdnM3U
9VPJKc6xq110S29WP9QbR52WsUu38fuh1BqOVFGUqICJXrlEZ5/OvD3kbU7mnmTab9MoKLWvO6aNNxtrpvWhpY8
L938aw6qYZNuNFEWpFsrRk3/TI7AHrw54lb3pe3ni9ycoNZXa1c7P3cDKKb3oc50Pz3wTz5vrD6ux9opSD6hEr1zR9S2
uZ27vuWw5vYVZm2dhlvZNVexmOPPxo7c2i2IN9YnMnNNAkY1zbGi1CldXQeg1F+3tr2V7OJs3oh9Aw9HD2b2nlkQ
wmY7B52G18ZEEOhh4N2NRzmXW8w7d3XF2UH9dVNqhjSbwWRCmkxlowNMLtcXyJCZytUxW89fvjeB2Vyu/WXII+//
9JlmMBmRJjPSZIRL9ta6xot7aTbBhb21jsbFmcB586r996P+5SmVui/sPrKLslm2bxm15lJm9JiBk87JZjshBE/f0IFADyee/2
4v45Zu5+OJ3Wnm6lgLU5v2kiYTsQqEWVr69618eckVzpeWlo2WPUajtcxY7pzx0jpXPHexDqVGazK+PFmaLO9vNpftL
0/i1PcuQo0GodWARiAO/fbCUI72WqBzd6mRj1eJXrHp8ajH0QgNH+/9mD1pe3h1wKu09WprV9vXvVrg725g+oo4bn
t/K59O6kHLZjXzI7khkSYTsQglc3HxxX1JCbK4GfIcJLm4xHJccuG4GfIsOS57XVx86bG1vbmK3PmKErd1w1xD3Wo6HeL
CptchdFrLa60WodeCVovQWZKf0GrQaAXCyZLshHAADQgBQgMlad1byhASyD0sZWbgwrEZgdnyGjNgRggTQpot56QJ
MJXtLa/Ng LHcOSMCI0hT2WdYPkdeGoOmfDxYY75Y59K2dv7eXPyq9Y/hAjWOXrHb1lNbmbl5Jvml+TwD/TR3tL/Drq
4cgLikLO5f/hdCCD6Z2J3IEM8ajvbqSLMZc0Eh5oLzyIICzBe2wkLM5y17WVvEuagIWWSMubglWVhk2RcVW88VX5bEr
XWLisrKKbXvBneFtFqEoyMaBweEoyPCQY/GQY/Q6xEE0oRei9Bp0eg0CK2wXE1qQWiEJalqpSUxaaRIExKhMVtfmxD
CmiAxltsbEZSWJUJBqWUvSxGUWPayBGSJNDHWIIOONHrQ6kGjLfdad3GvOYNWd4Vz5crL17/83BWPdZfW1Witm7X
8ktcVIAIN5XX0hqV6lVQ2jl4leqVK0gvTmb15NltOb2FlyBDM952Ph6N9D0gdS8tnwrKdpOUV8+5d3Rja0b4HsipSlpTPn
79sy7ck5/PIEnVBAebCgovJ+/Jz1mQuCwurFoQQCIMBjaPjxb2TExpHB4SDJelq9FqEXmNJujqBRicQOtBoJUJrRqMxW
5OsCSFMAoDQmhCi1vBYIFxMpJWgoQshihLkYsovAWATma/zSuEDrCDpH0DpUsHcEnYPI+JJNX8lrfSV1ypVdSKRXSgZ/
K9NV4RK56VCJXqlWZmnmp/v/w+K4xfGyFhil/ytEB1zx79ffpOYWMExJrSQlnWPmgBBGtnTBnH+FRH3+PKay4wLM+f
l/T+gFBXb3zQqDAY2zMxonJ8ve2RmNizPC2RmNkzMagx6NXovGQYPGQaDRScumNaHRGtFoShGiGA3F5RJulclchDA
WQEkBIF7YnwezsWq/VIOOdAZLQtU5WfcGy9XdvZcbrpCky+8NF19r9Sp5NnAq0SvVSpaUYMrL41BSHG9veoXzWanc
7DeUIV49kPnnMefmYcrNxZyXiyk3D1NerqUsLw9zTo6lb9gGodejcXG5uLm6ljt2Rnvh2OBoTc6g0V9IzKVORAKaTSkaU
WRJyqX5UJwLxXI/30ry7PvB9S7g4AIOztbXzqC3bhdeO7hcemxvmVZ/jX8qSINXWajXN2ObOHnXmabMTExZWRgzs
BlWTZJlqXMDkEsOwtDdg6mvDxkURFgeQjjsbJ3+pnUCxOT6nRo3d3Rurmh8fBA6+aGvnltzG7uaN3d0Li5g6srXx/KYV
NyDq0CXbi3Txct/QxoNCVoNEVoTOehKOFSrTgDio5dPM7NgcwGz+hAEd3CHS7uBk8wCPYenzZuQrL3C29qlrSAKIE3
4hIKTHn5WFMz8BkTdTg8sk6K/OSY2NWFrKggikONBq0np5ovbzQenni0LIWk9PNGXJ2g2tu7t178Gf2bG8nvgBxU5a
ZnWewDD366AgEwozy+1PWPdZcC6TqQ6ZPNTC2ide0X/gNHpw8rQk5wubR/DF147u1teX1TG4W87pnUGjngtUmjb
VddNAmAsKMKalUXruHMBUNlYpqWVbaerFsgtX25cTTk7ovLwsidvbG62XJzovb+uxpVznBt328kLr6olooyoS8M5B3zrl
vylDCrCsk8EwoyIZZq+EZPx/2Ojpye24ez2Rm4ySlZSSBkxc4eYOzd7m9Fzh7U6Rz43+HC/n+0HIK9W7c3rcz/+jeAZ2LI6
UfWfUdK4pNqo++HpMIJZYEnpp6WQI/d0mZOe/v/cjCYEDn74fe1w+dX7mtmQ9aL2+03I5lyV3jZH3lyWSE82mQfxby
zl6ayPPPXTw+nwpXmvZA72xN1FdK3N6UGjx4O30Hy05v5DrXEF7tM592/t3suqo+fC6Ped/vY8uRDDoGujN/dGe6t/S
+1l+xoJQKtHXE+aAgrj4ymIjaUwNo6igwcxZV5hHra9Hp1vs4sJ3N/fmsR90ZdL6Bo3t0vHsRfnQ9ZxyEmxJuyzF7cLif1
82hU5uAcXZuAWAK4Blv2FzTUA3ALBzR+cm9k9xvfCmPu8kjye7v40Y9uPtWvMvZSS/+09y8lf9nM6p4hbugbx3MgO
+Llf3dhiRWkqVKKvI8bMTArj4iiliaUgLo6i/fvBaAQhcGzXDqcu4egCATd5+aEvS+Z+aD09LY9JX0lxHmQeh8yjkHkMMo
5Z9piHLVflkDg4mtJ0m6B4Op/MWm7BV5M5K5+NTLqI6Mwg1lbZrHl1BYGhwxmfp/5eBrse1CqoMTlexuPsnTTmfR
awWPXt2Vin1Y46FR/u6JcyTUNEiHECOBNQAt8JKV85bLzbwCDryfOgJ+U0tN6zgQkWM8ISSlvtv5DTHRSykpTU6mID
aOwrhYcmJiKtI+HADh4ICHszjO3aJwjo7CKTISrbt7xW9WIGtN3pdtGUctXSrluQaAd2vL5mPde4ZaErmLb50P2zNLM5
/v/5w34t7A2+DNK/1foXtAd7vbn0g/z4lf9vPbwVSu83XhhZvD6Ne2WQ1GrCgN0zUleiGEfkgEhgEpWNZ+HSEL3F9B/e
IAVynlfdbjfCmla1UCbgiXppMFB86VHa1XhgbizEtDQCnHwFOxbviFNUN56goDGfhaBwcLn0DswNOLliuxDPKJ/Sjlu6V
8twCLybszqR+HXi1Ascq/WrrzP6M/Tyz6RmScpOY3GUyUyOmOTpYP+jrtwPnmP/Dfk5mFDAYLiBZ/+hIsJdzDUasKA3L
tSb63sA8KeUN1uPnAKSUL1dQfyswV0r5q/W4USR6c2EhhfEJZVfrhbt3Yz5/HgBd80Cco6JxjuqGU7duOLZpU3HXi7EY
9qyAzYst/ekXuDW/9Krc+zrrvpXI4ZpGoKC0gBd3vMjao2uJ9I3k/wb8H81dm9vdrvqjUxEd/HuOdjUcAeHhQGx4c0BqD
Xo1vV5RrTfS3AyOkIA9Yj+8BekopH7IC3RbAdiBYSmmYlhmB3YAReEVK+V9bAdenRF98+DBnXniBwj3xlomohMCxbV
vr1Xo0zt26om9uR7lqOQ+xn8LWtyHvNDTvcJ0fgoAw8GrZaJK5PX449gMLty9Eg4Z5feYxvOXwKrU/IV3liz/u56eEs4R6
OzP3pk7XPG+OojR0tZnoZ2BJ8tPLIQVJKU8JIVoDG4ChUsqjV2g7GZgMEBoaGnXy5Em7f8CaUhaTQ/K0hxGODnj+8xZ
Lcu/aFa2HfZn4AVCYDTs/hO3vWcact+wP/Z+A1oOb9Pjw5NxxZvw5g4T0BKL9o5kSMYWeAT3tng0TYMuRdOau3ceR
1HwGt/fl+Zs600pNgaw0UbxWdSOE2AU8LKXcWsF7LQd+kfJ+U9In1ocr+tx1P3P6mWfQBwUR+tGH6IOcqVYG+am
W5L7zI8tcKm1vgP5PQmjPmgm4ASo1I7Ly4EqW7V1GamEqXxy7MKXLFPoH9bc74ZeazHy69QSL1x+mxGjmwQGteH
hwG7WaldLkXGui12G5GTsUOIXIZuxdUsp9I9XrAKwDWknrmwolvIACKWWXEkIZsAOYXdGN3AvqOtFn/udzzr30Ek6
RkQS/9y46Ly/7G2cnw9a3IO4zS39851ug3+MQ2KXmAm7gik3FfhfKoz5O+Jt50/T0bsjU7pMYXDoYDTCvUGUqblFvP
K/g3y76xSBHgaeHdmBG8MD0WvVcEylaaiO4ZU3AouxDK/8REr5ohBiPhAjpVxrrTMPMEgpnY3Xrg+wBMTSLxpgsZTy
Y1ufV1eJXkp2uuvk/HhR7gOHUrQa4vQGOx8UCf9sOUGa/xXluOIO6Hv49CsT0f3MiUmkv54egPfJTWEUISbTxbMP
kLpMZ3ml4WjsnFls5kcnz3+1j/5lcfN0cGRsdwp09QtQIHAXRUw9M2UGWIHBmzhxyvluL551jCZgzB6G1I7mc2QN/vg

77v7PMYxl1AXo/Ap4hNR90I2U0G/n5xM98GP8hR3000tK9JQ+EP8CNrW9Er7H9XIDJLPn9UCpf7Ehi4yHLcwcD2/lyV
49QhnTwQ6eu8pVGSCV6G0z55zn12G0c37IF3389hs+UKbb7iJO2w6ZFcORXyyyJPR60jKJx9a2doJsAszTzW9JvLI1fys
HMgwS5BnFf2H38s80/cdA62H4DLCN0Vu5M4qu/kknNKyBA3cDY7par/EAP24ucK0pDoR9JYxpaSRNmULxoUQC58
/H87ZbK64sJR9zXIF3ILOPtAr2nQ/QHLVLpKjZBSillE0vil5CQnoC/sz+TwiZxW9vbMOjs61ozmsz8dtBylf/n4TQEMKS
DH3f1DGVgOz+0mqY7AkppHFSir0Dx8eMkP/AgxsxMgt9cjOuAAVeuaDbDwR/gz9fgzG5wD4I+j0K3ey0rBCm1QkrJtj
PbWLJnCXGpcfgYfJjQeQJ24/FWW//n0NyZgErdiaxKiaF9PxigjydGNS9hLHdQ/BXk6cpDZRK9FdQuGcPyVOMgkZDyJIP
cAoPv3LF3NPwn1sh7YDISdV+j0OXOy1rbSp1JuZsDEvil7D9zHY8HD24p+M93NXxLtwc3Ox+jxKjmfUHvHljiQ2H0IHq
xFc39GPu3q2oH+bZmjUVb7SgKhEf5m8jRs59fgT6Pz8CP1wKQ4tWLRcedUESFwHo9+1DJVUy8nVK3vS9vBh/lf8kflHb
no3xnUcxz0d77F7lswLTqSfZ8XOJL6OTSHzfAkh3k7c2T2UO6JD8HVzrKHoFaX6qERfTtbXX3N27jwMnToRsuQDdD4+F
Vc+8ht8fisMngUDn6mReJTqcSDjAEvjI7I+aT1OOidua3sbo1qPopNPpyo9bVtsNPHzvnN8ueMk249lotMlbugcwF09Q
+nd2kdd5Sv1lkr0WPp30999j/R33sGlf3+CF7+BxqWSx+WNxfBeb0DCQ9vsXnBDqVtHso6wNGEpy574FaM0EuQaxP
AWwxnecjidfTpXKekfTctnxY4kvolLibugJIY+ztzSNZhB7X0JD/JQSV+pV5p8opdG12dfeIHsr7/B45ZbCJz/AkJvYzz2pn/Dh
oUwfjW0ub7aYIFqR05xDhuSNvDzyZ/ZcXpHWdIf1mIYN7S8oUpJv6jUxP/2nmHFjmT+OpmJIODj4sCAdr4Mau9L/7a+
eLuoezZK3WrSid5cWMipx58g//ff8Zk6Bd/HHrP9DzrJLzbE9oOg7H/qZY4ILpzlen/cvIXtp/efknSH95iOGHNwuxO+hn
5xfx5OJ3fD6Wy6XA6medLEAK6BHsyqJ0vA9v7EhHsqYZrKrWuySZ6Y1YWyVOnUpSwl4A5s/EaN86+hivGwbE/4JGd4
BF8zXEo9UdOcQ4bkzfyy4lf2HZmG0azkeYuzS1Jv+VwwpuF2530zWZJwqkcfj+Uxh+JqexOzsYswctZT/+2F6/21c1cpTY
OyURfKpJC8v0PUHr2LEGvLclteju7Xw6tgxVj4foXoN+/rikGpX67UtlPdAks69OvStlHyDpfwp9HrFf7iWmk55CAEB7kwa
D2vgxs50tkiKeagGpEU0u0Rfu20fylKnI0JC3n8P527d7GtYWmjstEZYOpMNVa+CckpzuH35N/55eQvbD29tSzpX7JS
79KsS5WSvtks2X8ml98PpfL7oTTikrlwS/Bw0tOvbTNLN087X/zUA1pKNWISiT5/yxZOTX8UjacHoR9+iON119nfeONL8
Mf/wYTvoUFT8kqjV5uSS4bkzZekvQDXAIY1mIYg4IHEe4bjpOuavPk5BSUstl6tf9HYhqpecUAdAp0Z1B7X7q38iYi2FP
d1FWuWpNJ9Dlr13J65iwcr7uOkKVL0fv72d8446hIOGXHm+B2mzMpK01EbkmU5Ur/hCXpl5pLOWI0dPLpRJRfFN38u
9HVrysejvavOial5MCZPH5PtFzt57MwmS2/DsM9XYmlsSTiGAPIkl8CWvugZODekhPsa1JJHpjVhZHbxiBoWNHgt95G
62b/Y/ClyV8cTsk7YDpMeAWUMWllaYgrySPXam7iD0XS9y5OPZm7MVoNgLQxrMNUf5RdPPRjfbgS42P93KL/YSEJ
KDvEp2exJyWZPcg6nsgsB0GoE7fzdiAzxICLYky7BnrTzd1X9/MrfNIIED1B06BAOrVqhcajif3/3r4VV98ANL0PvaVX+XK
VpKjIWKzCeQNY500JS49idupsCYwEAzV2a083fkVsj/KJo5dGqSn38qXlFxCfnWBJ/Sg57krPJKSwFwKDXEB5kSfwRIZ5E
hngS7OVUpfdXGp8mk+ivSsl5eKeHZZrhyX+AVq01qlwdo9IIYIZiWeKPPRdLZIEmaF6OXnT162pl/n7d6ODTwa5FVC6Q
Unlyo4A9KdnsTs5mT3I2e0/nUml0W97fWW/t8rEk/i7BHvi4qmGdTYIK9JVZPw82vwGT1kGL3rXzmUqTIKXkZO5J4ILj
ypJ/cl4yAE46J7r4dintr5+/k06IKM2+CZWH0Q2fzrN09li6fxNQ8LvyTDvJ0op2/K2393Wjj68p1fq608XPFw8n+Lxil4aiON
WNHAG9iWTP2IlynIK5ednwj8G8vi4QDvSCK/sp6bAMY2li+UUn5q6/NqLdGnJcl7fS8BDNzyfs1/ntlKpRakliX+Xam7OJ
R5CInl32Bzl+a082pHW6+2tPNuRzuvdrRwa2H3erlg6e/fe8rS3x+fkS0R1HyOpZ8vu/IH8HNzpl016Zfff0dVfdPA3ZNIv
4loQUSgWFACvAXME5Kub9cnYIAtJTykcaegMxQDQggVggSkqZVdlN1kqilxl+u9my5usjsWoJQKVO5JXksSdtDwcZD5
KYlcjhrMMczzmOSZoAcNqQ60sazDe282I2yVWUaZpNZkpxZwJHUfl6k5XP4nGV/NDWf/GJjWT13g442fq609XO75Asg
yNNJTeDWAfSW6O3pkO4BHJFSHrO+2VfAaGB/pa0sbgB+IVJmWtv+CowAVtgTel3auxqOb4IbF6kkr9QZNwc3+gX1o
19Qv7KyYIMxx7KPkZiVWLB9kfiHa46sKavj5+z3t+Tf0qPIFfv9tRpBy2YutGzmwvX4I5VLKtmXW8yR1HwOp+ZZvghS8/
nt4DIWxiSX1TPoNVzna038vq609nUlxNuJEC9nPJ316n8BDYA9i4TISC53nAL0vEK924QQA7Bc/T8upUyuoG3QIT5ECD
EZmAwQGhpqR1jXoCgXfp4FgZEQfV/NfpaiVJGj1pGOPh3p6NPxkvL0wnQSMxMv+QLYfmZ72RBPvUbPdZ7XISX+tp5t
CXUPJdAl8IrdP0IIajwMBHgY6Ne22SXnss6XcCQtvyz5H0nNJ+ZEFt/tPn1JPVdHHcFeTgR7ORPs5USIt3Xv5UywtXpuBn
U/oD6oriEm3wMrpJTFQogpwKfAkKq8gZRYkBAULF031RTXlf3+CuSfgzu/VCTgKQ1GM6dmNAtqRp+gPmVlpeZStuSc
IDErkUNZhyzJ//R21h5dW1ZH9p9ER7BpMiFslIw4hLqHlR0Odg1Gr/17MvZycaC7izfdW3pfUn6+2MijJPokZBWSklVlc
maB9XUB246mc77EdEI9Dyf9xcRf/ovAund2UKPcaoM9v+VTQEi542Au3nQFQEqZUe7wl+DVcm0HXdb296oGwa3O
7YMDH0DUBAiOqtNQFOVa6TV62nq1pa1XW/7BP8rKs4qyOJJ9hOS8ZJJyk0jKSyllL4W41DjOI54vq6cRGgJdAgI2CybU
LZRQN+uXgLvli+DyqR5cHHV0bu5B5+Z/fxJYskl2QanlCyCroOxLIDmrgCNp+fyemEpRqfmSNj4uDgRbk36QpxN+bo4E
eBjwdzcQ4G7A180Rg15djf0re27G6rB0xwzFkrj/Au6SUu4rVydQSnng+voWYlaUspflZmwscGFWsTgsN2MzK/vMGr
sZKyUsuxHSDsL0WHD2tt1GURoRKSWZRZkk5yVbvgTykkjktXwJJOUIkV2cfUI9Pyc/y5eA+8UvgWC3TLtDCQAAC19JRE
FUYAJcAvA2eKMR9j+hK6UkPb+E5KyCv/1vIDmzgDM5RRQbzX9r5+WsX9/dYN0cCXA34Gf9IrhQ5uPq2OTXALimm7F
SSqMQ4hHgZyzDKz+RUu4TQswHYqSUa4FHhRA3A0YgE5hobZsphFiA5csBYL6tJF+j9nwFSVvhprdUkleaJCEEPk4++Dj
5EOkX+bfzuSW5/9/encfiWddxHH9/d2dnZmd2zt7dlttPWCwCAiWVMMREeVIEdkQmFEOBoyJAUUhGpCEGDWGPC
FIIAopFVTEaEVsBJVaakwQDGuhBVq1CD126c4ezOzs7Owcu/v1j+eZ6ew92237zDz9vpLjc8w8M5/dzHx/z/l7nEYg5T
QCxS2CZ3uf5YmxJ6a8NlAXYHnjclZEV9AV6XKG0a6j45Eu2hvbS42BiNDZHKKzOcsFb4/N+GxVZXisQDyVoy+VJZ7KEh/
OEh/J0jeco38ky74jKQbTOSanrZ/W1wmdTSG6loXpKtsq6GoJ09EUUpKMpRHtTkLZokFDg1NtCOHUumBpLwn3rlbYGb
nga6qyvEGMWI1PI0JPuoWekh/5MP32jfcQzceKZuDM+Gic/mZ+yTEACLI8sn9EAdEW7WBFxGob2cPuirhUyn5hkMJ
0nnsrSl8rS7w7jqZzTOKSy9A1nSWXHZ12+ORxwCn80SHtTkPamEB3RIB3NldqjToPQQRskPRpiWWNDzXautTTK/3h

me9CZsi5B6wVeWMWLDlIQKZ3RMxtVJZFLEB8tK/6ZOPHROH2ZPvYO7WXn4Z3kInJtIgtIgM5IJ52NnaWtjfawM+xo7J
gyHgIECNTXlC4WumCevGP5CeKpLEOjOQbTeYbSeYbSOYZG8wymcwyl87wxOEr3gQRvZfLMts5bXye0RYOOR49uFR
Qbg9ZIA7GIM2xtDBKLOtPVeZh1CjOb74E3Q/Be78Ap8331TDGHCSrOs3CRLu4bcapoUWqSjKXPN0Au1B32gfA2MD
9KR72D2wm0Q2UbpiuFy4PlxqCNOa26Y0BO1ht2Fwx6MN0dL1AwuZmFQsmaMNQHE4NFqcdsYPHcowIM7NOLuo
XChQd7QBKDUgXyahgdZIsPR8cXpZYwMNI7BHUv8X+slJePI2iHTAB+/0Oo0xpzQRIRaOEQvHOLvt7DIfNz45TjKXZGhs
iKGxIQazg6XxoewQg2OD9KZ72TOwZ85GIVQfoqOxg9ZQK63hVlpDrcRCMZaFlhELxUrzSo/GVjqaWir6O7KFCZKZAol
MnkQmz3CmQMkdHh4rkBjNk8gUGB7Ls78/TTKTJ5kpMD794EKZ5ICA1W0Rnrri/RVIWAz/F/oXfwG93fDRB5weKo0
xVS9QF3CuG2jsWPC10xuFYkNQHE/kEiSzSQ4MHyCZS045vXS6xkDjOcYgHDvaCExrKFpDrbSEWljZ3szaFZWdfaSqP
HPjJDOFqY3EWIHEqDN9os4c8nehz7zl9E759kvg/E94ncYYcwlspLEAKEwUSOaSUx6bILh3HCpUSjOPzxyMGQ2yUhhZM
73E4SmYBMtwRZagi00B5tLj/LpKc9Hm1kba6E5GKMxcOLvJeDvQv/Xb0F2GK69F6w/DmMM0FDf4Bz8jVTex1VhssB
wbthpDNxGIZVPMZIfKQ2Lj1Q+xcHUwdL42PjYvO8dkIDTEIRaWBFdwearNy/1T5z5Gcf9HatFTzfs+jlcfBN0net1GmN
MDWuoa1jUVkO5wmSBdD5dKvzIDcOU8Vxq1u4ojgd/FvrJCXjyVufer5ff7nUaY8wprKGUoXQA2iv+LPTdW5x+5j++BU
KL2uPMcb4jf+uHEoPwI7vWjMxw7kf8zqNMcz4zn+FfvtdUMJAnffYAVhjjMFvhf7gc7D7V3DjZdA5+2XaxhhzqvFPoZ
8Yd66AXbYaLvu612mMMaZq+Odg7PgYrFwH79wAwYX7tjDGmFOFfw9qBk23e91CmOMqTr+2XVjjDFmVlbojTHG5
yoq9CKyQUT+lyKviciMS01F5FYR2Ssie0Rkh4icXvbcchi85D62TV/WGGPMibXgPnoRqQfuB64CeoAXRGsbqu4te9mLw
HpVzYjll4DvA8XuIsdUdebNKY0xxpwUlazRvw94TVVfV9U88GtgU/kLVHWNqmbcyeeBVcc3pjHGmGNVSaFFCRwum+
5x583IRuBPZdNhEekWkedF5CNzLSQiX3Rf1z0wMFBBLGOMMZU4rqdXishngfXAB8pmn66qvSjYJvCMiLysqv+bvqyq
Pgg8CLB+/fq577dJlDFmUSpZo+8FVpdNr3LnTSEiVwJ3AhtVtXSbd1XtdYevA38D1i0hrzHGmEUS1flXnkUKAPwXuAKn
wL8AfFpVxy17zTpgK7BBVfeXzY8BGVXNiUgH8BywadqB3Nk+cwA4eGx/Eh3A4DEue7LVUlaorby1lBVqK28tZYayru
UrKer6qy3zVpw142qjovlzcBfgHpgi6q+KiLfBrpVdRtdW9AE/Na99+EhVd0lVAt4QEQmcbYe7l6oyLufWfk9vqYRkW5V
XX+sy59MtZQVaitvLWWF2spB51mhtvKeqKwV7aNX1aeAp6bNu6ts/Mo5lvsH8O6IBDTGGML0dmWsMcb4nB8L/YN
eB1iEWsoKtZW3lRjCbeWtpaxQW3IPSNYFD8YaY4ypbX5cozfGGFPgCr0xxvicbwr9Qj1sVhMRWS0iO90eP18Vkvu8zr
QQEakXkRdF5I9eZ1mliLSKyFYR+beI7BORi73ONBcR+Zr7HXhFRB4TkbDXmcqJyBYR6ReRV8rmtYnldhHZ7w5jXmYsm
iPrPe73YI+I/F5EWr3MwG62vGXP3SYi6l5/tGS+KPRIPWxeA5wDfEpEzvE21bzGgdtU9RzgluCMKs8LcAuwz+sQFfox8G
dVPRu4gCrNLSlrga/g9P6Hs51Kp/0NtUMDwMbps27HdihqmcBO9zpavAwM7NuB85T1fNXLvy842SHmsfDzMyLiKw
GrgYOH8P8kWhp4leNquJqh5R1V3u+AhOIzQvovzhPicgq4Fpgs9dZFiliy4DLglcAVDWvqklvU80rADS6V6BHgDc9zjOF
qv4deGva7E3AI+74l8CcnRWeTLNlVdWnVXXcnayqnnXn+N8C/BD4BnDczpTxS6FfbA+bVUNE1uD0//NPb5PM60c4X
7xJr4NU4AxApIzu6tP54hU5d3iX6g7sVZczsCDKvq096mqkiXqh5xx/uAli/DLMINTO1Zt+qlyCagV1V3H8/39Uuhr0ki
0gT8Dviiqqqa8zjMbEbkO6FfVf3mdpUIB4ELgJ6q6DhilenYtTOHu296E0zi9DYi6PcDWDHXOz676c7RF5E6cXaaPep1lLi
SAb4J3LXQaxfLL4W+oh42q4mINOAu+UdV9XGv88zjUmCjibZA2SX2IRH5pbeR5tUD9KhqcQtpK07hr0ZXAm+o6oCqF
oDHgUs8zlSJulicBuAO+z3OMy8R+TxwHfAZre4Lh96B0+jvdn9vq4BdlrJiqW/sl0L/AnCWjIwhIkGcA1pVe39acXp+ewjY
p6o/8DrPfft1DIVdpaprcP6vz6hq1a51qmofcFhE1rqzrgAW7EjPI4eAi0Qk4n4nrqBKDxxPsw243h2/HviDh1nmJSibcH
Y7biy7C15VUtWXVXW5qq5xf289wIXud3pJfFH03YMtxR429wG/Ke9GuQpdCnwOZ+24eOP0D3sdyke+DDwqlInuA9
wDf8zjPrNytjq3ALuBlN9jVV2uLyKP4XQvvIZeekTKRuBu4CoR2Y+zVXK3lXmL5sh6H9AMbHd/Zz/1NGSZOfKemM+q7
iOZY4wxS+WLNxpjjDFzs0JvjDE+Z4XeGGN8zgq9Mcb4nBV6Y4zxOSv0xhj1c1bojTHG5/4PGZ3prYJFR8gAAAAASUVOR
K5CYII=\n"

```
},  
"metadata": {  
  "needs_background": "light"  
}  
}  
]  
},  
{  
  "cell_type": "code",  
  "source": [  
    ]  
  ]  
}
```



```

"metrics[['loss','val_loss']].plot()"
],
"metadata": {
  "colab": {
    "base_uri": "https://localhost:8080/",
    "height": 282
  },
  "id": "Hnto7n3X3GSx",
  "outputId": "f3e1a0a7-6ac2-4d6b-d309-d106d8262386"
},
"execution_count": 30,
"outputs": [
  {
    "output_type": "execute_result",
    "data": {
      "text/plain": [
        "<matplotlib.axes._subplots.AxesSubplot at 0x7f8847bfb950>"
      ]
    },
    "metadata": {},
    "execution_count": 30
  },
  {
    "output_type": "display_data",
    "data": {
      "text/plain": [
        "<Figure size 432x288 with 1 Axes>"
      ]
    },
    "image/png":
    "iVBORw0KGgoAAAANSUhEUgAAAXoAAAD4CAYAAADiry33AAAAABHNCSVQICAgIfAhkiAAAAAlwSFlzAAALEgAACxIB
    0t1+/AAAADh0RVh0U29mdHdhcmUAAbWF0cGxvdGxpYiB2ZXJzaW9uMy4yLjlsIGh0dHA6Ly9tYXRwbG90bGliLm9yZ
    y+WH4yJAAAgAEIEQVR4nO3dd3hUVfrA8e+bZNJDEiAFSCgiPZFiaNJsKGDBhqio2MUGrv4s61pRV1d31bWLVYIsFrAA
    oqCAGhlgQChSliUBkpAChJB+fn/cCQRiZiYwySST9/M895mZe8+584aHvOfm3HPPEWMMSimlvJePpwNQSilVtzTRK6
    WUI9NEr5RSXk4TvVjKEtIN9Eop5eX8PB1AdVq2bGnat2/v6TCUUqrRWL58+R5jTFR1xxpkom/fvj3JycmeDkMppRoN
    EdlW0zGnXTciEi8iCORKnYisFZFJ1ZQZJyKrRWSNiPwmlj2rHNtq358ilpq9lVKqnrlyRV8G3GuMWSEiYcByEZInjFIXpcxfw
    DBjTJ6ljASmAP2rHD/DGLPHfWErpZRyldNEb4zZBeyyv98vluuBNsC6KmV+q1JlKRDn5jiVUkodp1r10Ytle6A38LuDYjcC
    s6t8NsAPImKat4wxU2o49y3ALQBT27atTVhKKS9QWlPkeno6RUVFng6lQQsMDCQuLg6bzeZyHZcTvYiEAl8Adxtj9tV

```

Q5gysRD+4yu7BxpgMEYkG5onlBmPMwqPr2huAKQBJsUk6AY9STUx6ejphYWG0b98eEff0OA2SMYacnBzS09Pp0K
GDy/VcGkcvljasJP+pMebLGsqcArwDjDbG5FQJLMP+mgV8BfRzOTqVJNRFREixYtNMk7ICK0aNGi1n/1uDlqRoB3gf
XGmBdqKNMW+BK4xhizscr+EPsNXEQkBDgHSK1VhEqpJkOTvHPH82/kStfNIOAaYI2lpNj3PQSOBTdGvAk8CrQAXrch
UWaMSQJigK/s+/yAz4wxc2odpQsqKgXv/LKFIZ1ackpcRF18hVJKNuUqjLpZDDhsQowXNwE3VbM/Deh5bA33219Uxi
dLtzFt2Xa+vWsl4UGu36hQSimA0NBQCgoKPB2G23nNXDfhwTzevao3u/KLuH/GKnRBFaWUsnhNogc4tV1z7h/Rhblr
M3n/162eDkcp1UgZY7jvvvtlSEggMTGRz//HlBdu3YxdOhQevXqRUJCAosWLaK8vJzrrrvuUNkXX3zRw9EfQ0HODxMi
bh5yEn/8lcszs9fTp10kveK1v16pxuaJb9aybme1o7iPW/fWzXjsgh4ulf3yyy9JSUlh1apV7Nmzh759+zJ06FA+++wzzj33
XP7xj39QXl5OYWEhKSkpZGRkkJpqjTPJz893a9zu4FVX9GDdkf73mJ5EhwVyx6cr2FtY6umQlFKNzOLF7nyyivx9fUlJia
GYcOGsWzZMvr27cv777/P448/zpo1awgLC+Okk04iLS2Nu+66izlZ5tCsWTNPh38Mr7uiB4gl9ufVq3pz+VtL+L8Zq5hyz
ak6bEupRsTVK+/6NnTOuBYuXmH3333Hdddxz333MO1117LqIWRmDt3Lm+++SbTp0/nvffe83SoR/C6K/pKvdtG8u
Dlbsxbl8m7i//ydDhKqUZkyJAhfP7555SXI5Odnc3ChQvp168f27ZtlyYmhptvvpmbbrqJFstWsGfPHioqKrj00kt56qmn
WLFihafDP4ZXxtFXumFQe35Py+HZ2Rvo0y6SPm0jPR2SUqoRuPjii1myZak9e/ZERHjuueeljY3lww8/5Pnnn8dmsxEa
GspHH31ERkYG119/PRUVFQA888wzHo7+WNIQhyEmJSUZdy08srewlPNeWURFheH7SUOICPZ3y3mVUu61fv16unX
r5ukwGoXq/q1EZLn9QdVjeG3XTaXwYBuvXdWH7Ii7p2+ioqKhtewKaVUXfL6RA/QMz6Cf4zqxk8bsnh7UZqnw1FKqX
rVJB19wPjT2jMyIzbn5v5J8tZcT4ejlFL1xrsSfWEulBRWe0hE+NdIp9Amlog7P1tJ7oGSeg5OKaU8w3sS/cE8eK0//FzzHe
9mgTZeH9eH3AMl3DM9RfvrIvJNgvck+qBI6DISlrwKGTWPY01oE84j53fj5z+zeXPhInoMUCmIPMN7Ej3A8MkQEg2z7
oLymqc+uHpAO84/pRX/+WEjf/yl/fVKKe/mXYk+KALO+w9kpsKv/62xmIjwzCWJxEcGcdfUFewpKK7HIJVS3iA0NLTY
1u3biUhlAEo3HMMuxI9QLfzoftF8MtzkL2xxmJhgTZeG9eHvMJS/va59tcrpbyXd06BMOp5SPsZvpkl130PPtW3Zz1ah/
PYBd35x1epvP7zZu48s1P9xqmUqt7sB2H3GveeMzYRRj5b4+EHh3yQ+Ph47rjJdGAef/xx/Pz8WLBgAXI5eZSWlvLUU0
8xevToWn1tUVERT912G8nJyfj5+fHCCy9wxhlnsHbtWq6//npKSkqoqKjgiy++oHXr1lx++eWkp6dTxl7OI488wtixY0/ox
wbXFgePF5EFirJORNakyKRqyoilvCwimOVktYj0qXJsvlhssm/jTzhiV4RGw7n/hO1LIPlDh0Wv6teWC3u25oV5G1myJad
ewlNKNTxj45l+vTphz5Pnz6d8ePH89VXX7FixQoWLFjAvffeW+vV61577TVEhDvr1jB16ITGjx9PUVERb775JpMmTSIIJ
YXk5GTi4uKYM2cOrVu3ZtWqVaSmpjJixAi3/GyuXNGXAfcaY1aISBiwXETmGWPWVSkzEuhk3/oDbwD9RaQ58BiQBB
h73VnGmDy3RO9lr6tgzf/gx8eh8wiliK+2mljwz0sSSc3Yy8RpK/l+4hCiwgLqPDyllAMOrzrSu/evcnKymLnzp1kZ2cTGR
lJbGwsf/vb31i4cCE+Pj5kZGSQMzIJBGysy+ddvHgx911FwBdu3alXbt2bNy4kYEDB/L000+Tnp7OJZdcQqdOnUhmTO
Tee+/lgQce4Pzzz2flkCFu+dmcXtEbY3ZY1bY3+8H1gNtjio2GvjIwJYCESLSCjgXmGeMybUn93mAe5ooZ0Tggv+CqYD
v7gEhRXBogB+vjevDvoOl3P35Ssq1v16pJmnMmDHMMdGDZz//nLFjx/Lpp5+SnZ3N8uXLSUIJISYmhqKiIrd811VXXcW
sWbMICgpi1KhRzJ8/n86dO7NixQoSExN5+OGHmTx5slu+q1Y3Y0WkPdAb+P2oQ22AHVU+p9v31bS/unPfliJlpKcnZ
1dm7BqFtkOznwENv0Aa2Y4LNqtVTOeuLAHv27O4dX5m93z/UqpRmXs2LFMmzaNGTNmMGBMGPbu3Ut0dDQ2m
40FCxawbdu2Wp9zyJAhfPrppwBs3LiR7du306VLF9LS0jjppJOYOHEio0ePZvXq1ezcuZPg4GCuvvpq7rvvPrfNbe/yzVg
RCQW+AO42xr3MUfAGDMFmALWNMVuO3H/WyH1C5jzAHQ8A0Ja1lh0bN94fv8rl5d+2kf9pGcdnLNZZVS3qdHjx
7s37+fNm3a0KpVK8aNG8cFF1xAymlisUIJdO3atdbnvP3227nttttITEzEz+PDz74glCAAKZPn87HH3+MzWYjNjaWhx5
6iGXLlnHffffh4+ODzWbjjTfecMvP5dJ89Cjia74F5hpjXqjm+FvAz8aYqfbPfwKnV27GmFurK1cTd85HD0DwenhzCPS4
CC59x2HRA8VIXPjqYvYeLOP7SYOJDgt0XxxKqRrpfPSuc/t89GittvousL66JG83C7jWPvpmALDXGLMLmAuclYKRIhJnG
PfV7+iu8GQe62bsxsdf31lgB+vjuVguJSjk1N0f56pVSj50of/SDgGuBMEUmx6bNEZIKITLCX+R5IAzYDbwO3AxbjcoEng
WX2bbJ9X/Obcg9EdYNv74Hi/Q6LdokN48nRCSxjy+G/P22qpWCVUo3NmjVr6NwR1xNb//79PR3WMZz20RtjFgPiplw
B7qjh2HuA55dE9wuAC1+Bd4fDj0/Aef92WHxMUjxL03J5Zf4m+raPZEinqHoKVKmmyxiD1YnQOCQmJpKSkIkv33k8y
7963xQljsT3hf4TYNnbsG2J0+JPxtSDk6NCuXtaCln73TOkSilVvcDAQHJyco4rkTUVxhhycnIIdKzdvUovXxz8GMUF8Pp
A6wp/wmKwOf4H25S5n/NeWcyIHrG8fGXvuolJKUvpaSnp6eluG6furQIDA4mLi8Nmsx2x39HNWO+c68aRgFC44CX4
5BJY+Dyc9YjD4p1iwpgrCMv/7SJK/rG65BLpeqlzWajQ4cOng7DKzWtrptKJ58FPa+CX19yaeKk20/vSNvmwTw8M5
WSsop6CFAppdynaSZ6gHOftalmnknJlc5LBpo8+WJOT1lyz7A24vS6ilApZRyj6ab6IOBW9MZ70qBpa87LX5GI2hG9Ijlf
mb2JfB/QLkSinVEDXdRA/WAiVdzoMFT00O8/VjH72gO4LwxDfrnJZVSqmGomkneHFrPL2vP3wzyeEmlwCti4KYdHYn
flyfyY/rMuspsKWUOjFNO9EDNGsN5zwJWxfBio+cFr9hUA6Ryfy+DdrOVhSXg8BKqXUIdFED9BnPLQfAj88Avt2OSzq
7+fDkxclKJ53kNcW6HTGSqmGTxM9HF6kpLwYvv8/p104A05qwcW92/DWwi1syS6opyCVUur4aKkv1KlJnPEQbPgW
1s10Wvzvo7oSaPPisZlr9ZfTpVSDpom+qgF3QKte8P19UOh4ks3osEDuO7cLizfv4dvJrt7lFLKkzTRV+XrZ81wWZgDPzz
stPi4/u1laNOMJ79dx/6i0nolUCmlak8T/dFanQKDjKHkP7BlvsOivj7CUxclkl1QzlvzdN56pVTDplm+OsMegBYnW2PrS
w44LNorPolr+7XlwyVbWbft7UvpKqXUCdNEXx1boNWFk78d5j/ltPj953YhPMjGIZNTqdClB5VSDYwm+pq0Ow2SboS
lbOC647nxiL49+fvlrizflseM5en1FKBSsrnGlcXB3xORLBFJreH4fVXWkk0VXIRaW4/tlVE1tiP1dFKInXo7MetJ2dn3glIJQ
6LXtonjr7tl3lm9nryDjguq5RS9cmVK/oPgBE1HTTGPg+M6WWM6QX8HfjlqAXAz7Afr3blkwYtsBmc/yJkr3c6w6WPj/
DkRQnsKyrjubl/1IOASinNNEb4xZCDgeVH7YlcDUE4qooel8LnQeCQv/DfsdT2TWNbYZ15/WnmnLtrNie149BaiUuo
65rY9eRIKxrvy/qLLbAD+lyHlRucVd31Xvzn0ayopg/mSnRe8e3pnosAAe+TqVsnJdJOp5XnuvBl7AfDrUd02g40xfYCR
wB0iMrSmyijyi4gki0hydna2G8NygxYdYcAEWPkp7FzpsGhogB+Pnt+DtVt38cnSbfUuoFJK1cydif4Kjuq2McZk2F+zgk

+AfjVVNsZMMcYkGWOSoqKi3BiWmwy9D4JbwOwHnU56NioxliGdWvKfHzaStU9XtFdKeZZbEr2IhAPDgJlV9oWISFjle
+AcoNqRO41CYDic9SjsWAprv3RYVESYPDqB4rIK/vn9+noKUCmlqufK8MqpwBKgi4iki8iNljJBRCZUKXYx8IMxpupjpD
HAYhFZBfwBfGeMmePO4Otd76shNhF+eBRKHk8b26FICBOGncTXKTv5bcueegpQKaWOJQ1xit2kpCSTnNxAh91v/R
U+GAWnPwSnP+CwaFFpOcNf/AV/Xx9mTxqKv58+n6aUqhsisrymYeyaeWqr/SDocTEsfhH2On4KNtDmy+QLE9isfYB
3FqfVU4BKKXUkTfTHY/hkwMC8x5wWPaNrNOd0j+GVnzaTnue4u0cppeqCJvrjEdEWTpslqTNg+1KnXR+9oDsAk79ZV
9eRkaXUMTTRH6/Bd0NYa5j9AFQ4fjAqLjKYiWd14od1mfy03vHTtUop5W6a6l+XfwgMfwJ2pcAq57M+3Di4AydHh/L
4N2spKi2vhwCVUsqiiF5EJI6BuL7w0xNQvN9hUX8/H54cncCO3IO8vmBzPQWoIFKa6E+MCIz4FxRkwqL/OCO+sGMLL
urVmjd/SSMTu6AeAlRKKU30Jy7uVOh5JSx5DXKdD6F86LxuBPj58OjMtTTEZxiUUt5HE707nPUY+Njgh0ecFo0OC+T/z
u3C4s17+G7NrnolTinV1Gmid4dmrWDIPbDhW0j72Wnxqwe0o0frZjz57Tr2F5XWfXxKqSZNE727DLzTGl8/5+9QXua
wqK+P8NRFcWTl+bFeZvqKUCIVFOlid5dbIFwzLOQtQ5WfOC0eO+2kVzZry0f/PYXa3furfv4lFJNliZ6d+p2IbQfAvOfho
POLxJ84NyuRAB78/DXqVRU6l1ZpVTd0ETvTilw4hkoyeef/+W0eHiwjYdGdWPl9nw+T95RDwEqpZoiTfTuFpslfcBdH1
Mga4PT4pf0aUP/Ds15dvYGcgqK6yFApVRT04m+Lpz5MPiHwtyHnC47KGLdmD1QXMYzs503DEopVVua6OtCEstrUZI
tP8GmH5wW7xQTxk1DTmLG8nT++CvXaXmllKoNtFR1pe/N0KKTNDdyrMRp8YInnUybiCAe/noNpeWOZ8NUSqnaOE
RfV/z84dx/Qu4Wq7/eiWB/Px6/sAcBmwt4b/Ff9RCgUqqpcGVx8PdEJEtEUMs4frqI7BWRFPv2aJVjI0TkTxHZLCIPujPw
RqHzOXDycPjIX1CQ7bT48O4xnN0thpd+3ERG/sF6CFap1RS4ckX/ATDCSZlFxphe9m0yglj4Aq8BI4HuwJUi0v1Egm2U
zv0nIbBcGqdcKv74hdY/0ROz1tZlVEqpJsRpojFGLASO5w5hP2CzMSbNGFMCTANGH8d5GreoZtDvFlj+Iexa7bS4rkallHI
3d/XRDxSRVSiYw0R62Pe1Aao+BZRu31ctEblFRJJFDK723k3R6My7H4IirRuzLowNfGNgzvQKTqUx2at5WCJrkallDox7
kj0K4B2xpiewCvA18dzEmPMFGNMkjEmKSoqyg1hNSBBkdbY+m2LYd1Mp8X9/Xx46qIE0vMO8sp8nfRMKXVITjjRG2
P2GWMK7O+/B2wi0hLIAOKrFI2z72ua+oyH6B7WnPwLzm+09j+pBZf0acPbi9LYnOV4mUKlIHLkhBO9iMSKiNjf97Of
MwdYBnQSKq4i4g9cAcw60e9rtHz9rHlw9m6HJa+6VOWhUd0I9vfj4a9TdTUqpdRxc2V45VRgCdBFNRJF5EYRmSAIE+
xFLgNSRWQV8DJwhbGUAXcCc4H1wHRjTNMeSnLSMOh2ASx6AfbtdFq8ZWgA94/owtK0XL5Oabp/DCmlTow0xCvFp
KQk5yc7Okw6kbuX/BaP+hxCVzyltPiFRWGS974jfs8Qn6653TCg231EKRSqrERkeXGmKTqjumTsfWteQdrNarV02DH
MqfFfeyrUeUeKOH5H3TSM6VU7Wmi94Qh90BoDMx5ACqcz2uT0Cac8ae159Pft5Oyl78eAIRkeRNN9J4QEABDJ0PG
clj2tkT7hnmajQAB7+eg3luhqVUqoWNNF7yilj4eSz4ccnIG+b0+JhgTYeOb87qRn7+GSp8/JKKVVJE72niMD5L1mv3
0x06YnZ809pxZBOLfn33D/J2ldUD0EqpbyBJnpPioiH4U9A2s+w8mOnxUWEyaMTKC6v4Knv1td9fEopr6CJ3tNOvQHa
DYK5D7s0tr5DyxBuG9aRWat2snjTnnolUCnV2Gmi9zQfH7jwFSgvgW/vcakL57bTO9K+RTCPzkyluEwnPVNKOaaJviFo
ORHO/AdsnA2PxztHmjzZfLoBNL2HOcTX9LqLICIVGOmib6hGHA7tDkVZt8PB5x3yQztHVMV5p7Ti1QWb2ZZzoB4CVE
o1VproGwofXxj9GhTtg+/vc6nKI+d1x+YjPDpZrU56ppSqkSb6hiS6m7VlydovYf23TovHhgdyzzld+GVjNnNsD9dDgEqpx
kgTfUMz+G8Qkwjf3QMH85wWHz+wHd1bNeOJb9ZRUFxWDwEqpRobTfQnJa8NRR9q9dPPfdhpcT9fH566OIHm/U
W8NG9jPQSolGpsNNE3RK17waCJkPIJB7JafE+bS05om9b3v9tK+t37auHAJVSjYkm+oZq2IPQohN8MwmKnS8l+MCI
LkQE2fjHV2uo0EnPIFJVaKJvqGyB1iicvenWxGdORAT78/dR3VixPZ/pyTvqLICIVGOhib4ha9sf+k+wpjLe+qvT4pf2aUP
/Ds156rv1pGUX1EOASqnGwJU1Y98TkSwRSa3h+DgRWS0ia0TkNxAhpWeXYVvv+FBHx0rUB69hZj0BEO5h1F5QedFh
URHhxbC9svsLtn67gYlIOj6CUcu2K/gNghIPjfwHDjDGJwJPAIKOOn2GM6VXTWobKcF8QuPBlyN0CC/7ptHjriCBeuqI3f
2bu5+GvU/VBKqWU80RvjFkI5Do4/psxpnlA91lgzk2xqUonnQ59xsOSV61VqZwY1jmKiWd24osV6dpfr5Ryex/9jcDsK
p8N8IOILBeRWxxVFJfBRcRZRJKzs7PdHJYXOOdJCI2Fr++AsmKnXSee1YnBJ7fkkZlrWbtzbz0EqJRqqNyW6EXkDKxE/0
CV3YONMX2AkcaAdjK0pvrGmCnGmCRjTFJUVJS7wvlegeFw/ouQvR4W/cdpcV8f4b9X9KJ5sD+3f7qCfUWI9RCkUqoh
ckuiF5FTgHeA0caYnMr9xpgM+2sW8BXQzx3f12R1GQGJl1uJfne198aP0CI0gFev6k1G3kHu+98q7a9Xqok64UQVlm2
BL4FrjDEbq+wPEZGwyvfAOYDz7KQcG/kvClqEmXdAuF05bZLaN+fBkV2ZuzaTdx/VQ8BKqUaGleGV04FlgBdRCRdRG
4UkQkiMsFe5FGbFD6UcMoY4DFIrIK+AP4zhgzpw5+hqYlUdMmeh52pcCSV1yqcuPgDozoEcszszewbGuN99WVUI5
KGuKf80IJSSY5WYfd18gY+Pxq2DQPbvsVWnZyWmVfUSkXvrKYg6XlfDdxCC1DA+ohUKVUfRGR5TUNY9cnYxsjETjvP2
ALgpl3QkWF0yrNA28Nq4P+YWI3D0thXKdD0epJkMTfWMVFGsjnoEdS60pElzQo3U4T45OYPHmPfz3p011HKBSqq
HQRN+Y9bwSTj7bmVQsb6tLV57vG8+YU+N4Zf4mfV4zq27jU0o1CJroGzMR0P8l6/WbSVbfvQsmj06gS0wYf/s8hYx8x
/PnKKUaP030jV1EPax/AtJ+hpUfu1QlyN+XN64+ldJywx2frqCkzHkfv1Kq8dJE7w1OvQHaDYa5/4B9O12q0qFICM9dd
gopO/J5Zvb6Og5QKeVJmui9gY+PNcNleSI8e4/LXTijEltxw6AOvP/rVr5bvauOg1RKeYomem/RoiOc+TBsna1rZrhc7cG
RXenTNoL7Z6xiiy5WopRX0kTvTQbcBnF9rRuzO1NcquLv58OrV/UhwObL7Z/oYiVKeSNN9N7Exxcu/9iaJuHTMS4Pu
WwdEcRLY3uxMUSXK1HKG2mi9zbNWsHVX0B5CXxyKRZlcv4HGKqLISjltTTRe6OoLnDINMjFAVOvgJCl6pNPKsTQzrp
YiVKeRtN9N6q3UC49B1IXwZf3AQVzvvefX2El8YeXqXk70FdrEqpb6CJ3pt1vxBGpGd/fgff3+fSsMsWoQG8Nk4XK1HK
m2ii93b9b4FBkyD5XVj8gktVTm1nLVbyw7pM3lmi5Uo1dhpom8KznrcWoLwp8mQMtWIKpWLITw7RxcRUAqx00Tf
FPj4wOjXoMMwmHUnbP7JaRUR4bkxpxAfGcSdn61gT0FxpQSQlKoLmuibCj9/GPsJRHWD6de69EBVs0Abr487lfzCUiZ
NW6mLISjVSLmU6EXkPRHJEpfqF/cWy8sisllEVotInyrHxovlJvs23l2Bq+MQ2AzG/c9aXPyzy116oKp762Y8eVECv27O4
eGvUzXZK9UluXpF/wEwwsHxkUAn+3YL8AaAiDQHHgP6A/2Ax0Qk8niDVW5Q+UBVWTF8chkUOu9/vzwpnttP78jUP
7YzcdpKndZYqUbGpURvjFkIOMolo4GPjGUpECEirYBzgXnGmFjTB4wD8cNhqoPhx6o2g6fjYVS54uP3D+iKw+N6sp3

q3dx44fLOFBcVg+BKqXcwV199G2Aqs/Np9v31bT/GCJyi4gki0hydna2m8JSNW03EC59u1YPVN0ytCPPX3YKv23J4ap
3fifvQEK9BKqUOIEN5masMWaKMSbJGJMUFRXl6XCahu6jYeS/YMO3MPt+lx6oGpMUz5tXn8r6XfsY89YSdupShEo1e
O5K9BIAfJXPcfZ9Ne1XDUX/W+G0ibDsHVJ8oktVhneP4aMb+pg5t4jL3viNzVk6j71SDZm7Ev0s4Fr76JsBwF5jzC5gLnc
OiETab8KeY9+nGpKzn4DEMfDTE7BqmktVBpzUgqm3DKCKvILL31rC6vT8Og5SKXW8XB1eORVYANQrKXQRuVFEJoI
BHUR74E0YDPwNnA7gDEmF3gSWGbfJtv3qYbExwdGvw4dhsLMO2DLfJeqJbQJZ8aE0wj29+XKKUv5dfOeOg5UKXU8
pCFOWpWUIGSSk5M9HUbTU7QX3h9Ija+//nto1dOlapn7irj23T/4a88BXrqiF6MSW9VtnEqpY4jlcmmNMUnXHGsZNW
NUABlDuBkQGGFfoWqbS9VimgUy/daBJMaFc8dnK/js9+11HKHsqjY00asjHXqgqshaocqFB6oAwoNtfHJf07vHMVD
X63htQWbdYpjpRoITfTqWNfDdz9QNfUKlx6oAgjy92XKtUlc3LsNz8/9k6e+W0+FTpmgIMdpolfVa3caXDIFdvzh8gNV
ADZfh/4zpfXD2rPu4v/4v/+t4rScp0yQSLP0kSvatbjlhjxrP2BqgdceqAKwMdHePT87vzfOZ35cmUGt368nIMlrjUUSin3
00SvHBswwf5A1dsw5+9Q7to6siLCnWd24umLE1jwZxbXvve7rkGrIJ8iGfsAABYCSURBVldoolfOnf0E9L8Nfn8D3h8J+T
uc17Eb178dr17Zh5Qd+Yx9awZ+4rqMFCIVHU00SvnfHxg5LMw5gPI2gBvDoY/57hc/bxTWvH+df3YnlvlpW/+xracA3
UXq1LqGJrolet6XAY3/glR8TB1LPzwiMtdOYM7tWTqzQMoKCrj0JeWsHbn3joOViVSR09qp0WHeHGHyHpRvjtZfjgfn
jr2jx1PeMj+N+E07D5Cle8tZTf03LqOfilFGiiv8fDFgjnvwCXvguZqVZXzqZ5LLU9OTqUL247jehmAvz73h/8uC6zjoNVS
mmiV8cv8TK45Wdo1ho+vQx+fALKna881Toiip9NOI2usWHc+slynpm9nsISXbFKqbqiiV6dmJad4KYfoc94WPwCfHQH
7NvltFrzEH8+u3kAl/Zpw1u/pDH8hYXM06t7peqEJnp14mxBcOHLcPEU2LnS6spxYarjKAA/nrusJ/+bMJDQAD9u/iiZm
z5MJj2vsB6CVqrp0ESv3KfnWksrJyQKPr4E5j/t0tQJfds359uJg/n7yK78unkPw19YyJu/bNGpE5RyE030yr2iusDN86HX
OFj4HHw0GvY775Kx+fpw67CO/HjvMIZ0asmzszdw3sul+OMvXadGqROliV65n38wXPQaXPQGpCdbXTlpv7hUtU1EE
FOuTeKda5M4UFzO5W8t4b7/rSL3QEkdB62U99JEr+pOr6vlgUQFGld2f/8rMuzYJ7dPYZ59wXlwrCOFlUygzP/8zPT/ti
u0x4rdRxcXTN2hlj8KSKbReTBao6/KClp9m2jiORXOVZe5dgsdwavGoHoblZXzilj4edn4JNLCoLdLparB/n48OLr308aQu
foMB78cglj3lrCht376jhopbyL0zVjRcQX2AgMB9KxFvm+0hizrobYdwG9jTE32D8XGNGCaxOUrhnrhYyBIR/D9/dZSxV
e9i60H1yL6oYzy9N5ZvYG9h4s5YZB7bn77M6EBPjVYdBKNR4numZsP2CzMSbNGFMCTANGOyh/JTC19mEqryYCfa6F
m36CgFD48AJY+DxUuDayRkQYkxTPT/cM4/KkON5e9Bdnv/ALc1J365KFSjnhSqJvA1Sdlzbdvu8YItIO6ABUHUQdKCLJI
rJURC6q6UtE5BZ7ueTs7GwXwlKNuMyCNQSZxyUw/ynridqcLS5Xjwz55ILTuGL2wYSHmRjwifLufHDZHBk6th7pWri7
puxVwAzjDFV77i1s/85cRXwkoh0rK6iMWaKMSbJGJMUFRXl5rBUgxlQBpe+A+e/BNt+g1f7wte3Q26ay6c4tV1zvr1r
MA+f142laTkMf/EXXluwmZlyHXuv1NFcSfQZQHvYz3H2fdW5gqO6bYwxGfbXNOBnoHeto1TeRwSSrodJq6D/rZD6Bb
ySBDPvgLytLp3Cz9eHm4acxl/3DOP0ztE8P/dPRr28iKU6K6ZSR3DIzqwf1s3Ys7AS/DLgKmPM2qPKdQXmAB2M/aQiE
gkUGmOKRaQIsAQYXdON3Ep6M7YJ2r8bFr8Iye+DKbeGZg75P4hs5/Ip5m/I5NGZaOnPO8joXq25echJLLQr8OglWo4
HN2MdZro7ScYBbwE+ALvGWoeFpHJQLixZpa9zONaODHmwSr1TgPeAiqw/np4yRjzrrPv00TfhO3baSX85R+AqYDeV
1sJPyLeaVWAgYXlvLpgE+8t3srB0nJ6t43g2oHtGJXYigA/37qNXSKPOuFEX9800Sv2ZlizYa74yBqa2ecaGHIvhMe5Vv1g
KV8sT+eTpdltI23OA5iH+j00bz7j+bYmLDK7j4JWqf5roVeO1Nx0W/QdWfHx4iObgeyC82oFfx6ioMPy6ZQ8fLdnGT+ut
OXfO7BrDtQPbMfjklvj45F1Gr1S90USvGr/87VbCX/kJiA+cep2V8Ju1cvkU6XmFfPb7dj5ftoOcaYwC1DKEcQPacdmPcY
QH2eoudqXqgSZ65T3ytsGif0PKZyC+1sidwX+DsFiXT1FcVs73a3bx0ZJtrNyeT5DNI4t6t+aaAe3p3rpZHQavVN3RRK+8
T95W68nalKnga4OkG2DQ3RAWU6vTpGbs5aMIW5mZspPisgqS2kVyzcB2jExohb+fzvmnGg9N9Mp75abBwn/Dqmn
g6w99b4RBkyA0ulanyS8s4X/J6Xzy+za25RTSMjSAK/vFc1X/trQKD6qj4JVyH030yvvblGu8Fd/Dr4BVh9+zyugVU/rJq
6LKioMv2zK5uMI21jwZyX+lgzvFsM1A9txWscWSC3OpVR90kSvmo49m62VrVK/gloyaHEyJFxbqVFdanWqHbmFfPL7
NqYv20FeYSkdo0IYkxTPWV2jOTk6VJO+alaA00aumpzAX1s+yEv5fiwADMqMqCImV9CPbu3yqotJyvl29i4+XbmPVDm
uphfmQZzZJZozu8XQv0NzAm36MJbyLE30qmnbvXvWfmOl/fQ/rH1tkqyE3+PiWg3RzMG/yliNWSzYkMWvW/ZQVFp
BkM2XQSe35Kxu0ZzRJRy8MA6+kGUqpkmeqUq5W2DtV9ZSX/3akCsBVASLoFuoyGkhcunKiotZ8mWHOZvyGL+hiw
y8g8COL1VMMyvpd42mZ1wEvvpQLqoHmuiVqk72RLj7JayZATmbrHH5Hc+AhMug6yglDh1CNGMMGzML7Ek/k+Xb8qg
w0CLEn2FdojizazRDO0fRLFAfzFJ1QxO9Uo4YA5mpVsJP/RL2brdG7nQabnXvdB4B/rWbHye/sIRfNmYzf0MWv2zMjr
+wFD8flal9JGd2jebMrjF0jArRG7rKbTTRK+UqYyA92eraWfslFGSCLcS6wk+4FDqeCX4BtPlWxkFK3fkM9/et79h934A
2jYPTif9aJLaRxLsr+vfquOniV6p41FRDtt+ZL+uplwMA/8AiGur9Wv326Q9d5Wu5uvGfkHDyX9XzfobisAl8foWtsGL3
bRtArPpLebSPo0CJE11TLtNEr9SJKi+FtJ9hy3zYugh2pwLGehq3TRK0H2QI/7h+termOVhSztK/clixLY+v2/NJ2ZFQXE
ZAOFBNNrFR9iTv7VFBPvXzc+nGj1N9Eq528E82L4Uti62rvp3rblWsvGxQZs+1tV++0EQPwACQl0+bXmFYUt2ASnb81
m5w0r+f2bup/LX9KSoEHrbr/h7xUfQNTYMP1+dk0dpoleq7hXtgx2/H078O1daT+aKL7TuZU/8g6HtgFqN5gEoKC5jdX
o+K7fn26/689hTUAJAKM2XxLhwereNONQAXDTTcfXNkSZ6pepbCYH1cNbWxbD1V8hYDhWI1z6sYnQbrB1xd92IAQ
3r9WpjTgk5x1kxfY8UnZYyX/tzr2Ullu/y63DA+ndNpJe8RF0iQ2jc0wYMc0CdISPI3PHmrEjgP9irRn7jjHm2aOOXwc8j7
V4OMCrph37MfGAw/b9z9ljPnQ2fdpdep6QQ0pdZV/tbf7XelxcDAjE9rO6e2FOsRiCmBwSE1er0RaXlrNu171A//8r
teaTnHTx0PCzQj07RoXSOCaNTTNih990Ael8TSvQi4gtsBIYD6cAy4EpjzLoqZa4Dkowxdx5VtzmQDCQBBlgOnGqMyXP
OnZroldcrLbKu8rf9eriP/2CVX4vmJ1IJPzbcAMQ1qpWM3HmFBSzMbOAZVn72ZhZwMbM/WzKKiD3QMmhMmGBfl
byjw6lU0wYnWosBiA6TBuAxsZRondl4G4/YLMxJs1+smnAaGCdw1qWc4F5xphce915wAhgqiuBK+W1bIH2kTqDrM/
GwL4M2L3GGtGzezXsWm0N66wU1PzY5N+yk7XwSjVahAYwMDSAgR2PnNZhT0ExmzIL2JS1n42ZViMwd+1upi3bca

hMs0C/Q4m/U3QYnbQBaNRCsFrtgB1VPqcD/aspd6mIDMW6+v+bMWZHDXWrxXdvZRG4BbgFo27atC2Ep5UVEIDz
O2rqMPLy/aB9krrU3AKutJ3j/eNve7YP1BG90N4hNOLLrx8EN35ahAbSsoQHymLm/SiNQwJzU3UwtPLIBODk6lLbNg
4m3b23tW0yzQJ3Xp4Fy16N43wBTjTHFIInlr8CFwZm1OYIyZakwBq+vGTxEp1bgfNoN2A62tUnmZNTdPZflfvQb+nG
0tnF4psr01LXOLk6FFR2je0XoNjamx+6eyAtitY8tD+4wx7CkoYVOW1QBSzNxPWvYBkrflMWvVTiqq/KbafIW4SHsDEB
l0qAGobBB0AXbPcSXRZwDxVT7HcfimKwDGMJwqH98BnqtS9/Sj6v5c2yCVUIX4+IlX8dHd4JTLrX3GWNmXv03+mWt
h41xrtE8l/1Bo3uFw4q/6GtLymEZARlgKCyAq7MgGAKC0vIKd+QfZnlvljtK10J25BWYoj2f/MLSI8qHB9nsiT/o0F8C8Z
HwA+uIlF2jtw65cjPWD6s75iysxL0MuMoYs7ZKmVbGmF329xcDDxhjBthvxi4H+tiLrsC6GZvr6Dv1ZqxSblJeBnt3QO4
WyEmzv26xXvO2gSk/XDagmXUT+OgGoEXHWg8BBdh7sJQduYwk5xWyPbdyO0h6biHpeQcpKa84VNZHIDoskNjwQ
GKb2V/DA2kVHkhMs8OvusBLzU7oZqwxpkxE7gTmYg2vfM8Ys1ZEJgPJxphZwEQRuRAoA3KB6+x1c0XkSazGAWCysy
SvlHljXz/7FXwHOPmoY+WlKL/9cOKvFE1PtubsN4cTMYERhXN/8w7WvYRmbSA8HsLbgH/IMV8dHmQjvE04CW2OvV
9QXmHI3FFejtzDjcDO/Cly9xWxKWs/izfvOTQVRFWRwbZDid9qFIKIDQ8gNjzlaiCaBdIsyE9vGB9FH5hSSh2rrNi64q/aA
ORsgdw02JuONVq6isClw0n/UCMQd/h9s9Y1jg6qyf6iUjL3FbF7bzG79h4kc18Ru/YWHfFa+YRwVUE23yP+MogKC6Bl
qP+hexDW5k/zEH+vmj7iRldXKqWaGr8AiOpsbUcrK4H9u6zhoHvTD2+Vn7cvhaL8oyoJhMVW3whUvg9uCT6HE29Yo
l2wQBSnR9f88FhxWTlZ+4qPaQR27yti994i/vgrl+yCYkrKKo6pKwKRwf5HNAIt7O+jQgNoGXbk/gC/xtttplleKVU7fv4Q
2c7aalJccGRDsC8D9mZY9wsyU2HjHCgrOrKOjx+ERENotDU6KDTaahwq31d9tXcVBfj5HhrVUxNjDAXFZewpKGFpQTF
79hez50CJ9VpQuZWwOj2fPQUl1XYZgfVwWVSVxB8Z4k9ksl3IYH9rC6nyPtifsEC/BjPntCZ6pZT7BYRCVBdrq44xUJgL+
6r8RbB/NxRkWYu97N9lPS18lOvlewWV/EOPTf6HXqtsISORX9uhvw46tDz2XsLRDpaUH2oAciobB3tjkF1QTE5BMZuy
CsgvLCGvsJTyuq7v319hlggGxHBNpqH+BMR7E/zYH8i7A1C82B/loIt9gbDajTCg2x10p2kffRKqYarohwKc6zkX5B5uCE
45jUTivZWcwKBoAgblHzFtLS/r659RrQzOWpJowx7Csqli7+whNwDJeQXlpJ31Pu8whLyDhz5vuql06oig22sfPSc4/qn0
j56pVTj5ONrv1KPBhldly0tOjb5F2RB4R6rsSjMsUYZZayw3leUVn8eH1uVhQb5lYagxZH7AyOQoAjCAyMljwynXQvnfy
2A1TgUlPRX0wCUHH2L22000SulvIMt0Pm9g0rGQPf+ewOQe2RjUjgDB/bY9+dYcw8V5tgnnaspFYv1l0BQuDUCKSjiy
NfA8EPvJSiCkMBIqoiliuMgFaR1jDYQsJXinV9lY00sENrOeC3BFeZk1mqiyMTiYb32u9nUv7Nl4eN/RN56P5h9mNQ
Th8XDD7BP/+Y6iiV4ppVzh62d144S0dF72aKVF1TcGR++royt7TfRKKVXXbIFgi7WGi3qA9zwWppRSqlqa6JV SystpoldK
KS+niV4ppbycJnqlIPJymuiVUsrLaaJSikvp4leKaW8XlOcvVJEsOfTx1m9JbDHjeHUpcYUKzSueBtTrNC44m1MsUlJivdE
Ym1njlmq7kCDTPQnQkSSa5qqS6FpTLFC44q3McUkJSvexhQrNK546ypW7bpRSikvp4leKaW8nDcm+imeDqAWGLOs
0LjibUyxQuOKtzHFCo0r3jqJ1ev66JVSSh3JG6/olVJKVaGJXimlvJzXJHoRGSEif4rIzhF50NPxOcli8SKyQETWichaEznk6Zi
cERFFEvkplT96OhZnRCRCRGalyAYRWS8iAz0dU01E5G/2/wOpljJVRAI9HVNvIvKeiGSJSJGqVfc1FZJ6lBLK/Rnoyxko1xP
q8/f/BahH5SkQiPBljVdXFW+XYvSJiROQ4lrM6llckehHxBV4DRgLDgStFpLtno3KoDLjXGNMdgADc0cDjBZgErPd0EC76
LzDHGNMV6EKdJvtE2gATgSRjTALgC1zh2aiO8QEw4qh9Dwl/GWM6AT/ZPzcEH3BsrPOABGPMKcBG4O/1HZQDH3B
svlHlPHAOsN1dX+QVIR7oB2w2xqQZY0qAacBoD8dUI2PMLmPMCv7/Vijql1no6qZiMQB5wHveDoWZ0QkHBgKvAt
gjCkxxuR7NiqH/IAgEfEDgoGdHo7nCMaYhUDuUbtHAX/a338lXFSvQdWguliNMT8YY8rsH5cCcfUeWA1q+LcFeBG4H
3DbSBlvSfRtgB1VPqfTgBNnVSLSHugN/O7ZSBx6Ces/XoWnA3FBByAbeN/e1fSOilR4OjqjGGMygH9jXbntAvYaY37wb
FQuiTHG7Lk/3w3EeDKYWrgBmO3pIBwRkdFAhjFmlTvP6y2JvIESkVDGc+BuY8w+T8dTHRE5H8gyxiz3dCwu8gP6AG8
YY3oDB2g4XQtHsPdtj8ZqnFoDISJytWejqh1jjc9u8GO0ReQfWF2mn3o6lpqISDDwEPCou8/tLYk+A4iv8jnOvq/BEhEb
VpL/1BjzpafjcWAQcKGlBMXqEjtTRD7xbEgOpQPpxpjKv5BmYCX+huhs4C9jTLYxphT4EjjNwzG5IINEWgHYX7M8HI9D
InldcD4wzjTsB4c6YjX6q+y/b3HACHGJPdETe0uiXwZ0EpEOluKpDUNrlodjqgGICFYf8npjzAuejScRY8zfjTFxxpj2WP+u8
40xDfaQ0xizG9ghlI3su84C1nkwJEe2AwNEJNj+f+IsGuiN46PMAsb348HZnowFodEZARWt+OFxphCT8fjDFmjTEm2h
jT3v77lg70sf+fPiFekejTn1vuBOzi/aJMN8as9WxUDg0CrsG6Ok6xb6M8HZQXuQv4VERWA72Af3o4nmrZ/+qYAawA1
mD9Pjaox/VFZCqwBOgilukiciPwLDBcRDZh/VXyrCdjrFRDrK8CYcA8++/Zmx4Ns0oa4q2b72rYf8kopZQ6UV5xRa+UUq
pmmuiVUsrLaaJSikvp4leKaW8n CZ6pZTycprolVLKy2miV0opL/f/ntvtTxVet48AAAAASUVORK5CYII=\n"

},

"metadata": {

"needs_background": "light"

}

}

]

},

{

```

"cell_type": "code",
"source": [
    "\n",
    "metrics[['accuracy','val_accuracy']].plot()"
],
"metadata": {
    "colab": {
        "base_uri": "https://localhost:8080/",
        "height": 282
    },
    "id": "A7sYVlwJ5oMk",
    "outputId": "b2759bff-5fd2-4724-8631-33632a0f7dfb"
},
"execution_count": 31,
"outputs": [
    {
        "output_type": "execute_result",
        "data": {
            "text/plain": [
                "<matplotlib.axes._subplots.AxesSubplot at 0x7f8847b86d50>"
            ]
        },
        "metadata": {},
        "execution_count": 31
    },
    {
        "output_type": "display_data",
        "data": {
            "text/plain": [
                "<Figure size 432x288 with 1 Axes>"
            ]
        },
        "image/png":
        "iVBORw0KGgoAAAANSUheUgAAAXQAAAD4CAYAAAD8Zh1EAAAABHNCSVQICAgIfAhkiAAAAAwSFIAAAAEgAACxlB0t1+/AAAADh0RVh0U29mdHdhcmUAAbWF0cGxvdGxpYiB2ZXJzaW9uMy4yLjlsIGh0dHA6Ly9tYXRwbG90bGliLm9yZy+WH4yJAAAgAEIEQVR4nO3de3xU9bnv8c+T+z3kSm5Awj1ARCSClx6lIt3YKrS6Ed3WrbbK6UW31Z6taOvIWE/rPm

```

13a89222K3Wndr2S1Updb73V1vgFUICSByDSQkJCQzSchlMs/5Y00uxIRMwoTJTJ736zWvmbVmrTVPQvLIl9/6rd8SV
cUY0zoiwh2AcYYYwLDA0YY8KEBboxxoJC3RjjAkTFujGGBMmool1wZmZmVpYWBisjzfGmJC0efPml6qa1d97QQv
0wsJCNm3aFKyPN8aYkCQi+wZ6z7pcjDEmTFigG2NMmLBAN8aYMGGBbowxYcIC3RhjwoRfgS4iS0Vkh4jsEpHV/bw/
SUrEfZEtIvKgiBQEvRjjDEnMmigi0gk8BBwETALuFJEZvXZ7CfAE6p6GnAf8KNAF2qMMebE/BmHvgDYpaq7AURkLbA
cKO+1zSzgVt/r14GnA1mkMcaMap0d0N4E7S3Q0QLtzc6j63XfddP/DvLnB7wMfwl9HzjQa7kSWNhnM4+BS4EHga8A
ySKSoap1vTcSkVXAKoCJEycOt2ZjjPGfKnS2O0Haccz3aDn+ub15gPdafCHtC+Pu111B7Xvt7RhaTUnjgxb0/vhfwL+JyLX
AW8BBolPvRqq6BlgDUFpaanfWMMY4VMHT6gvNpp7AbG86vnXb3crtu9zSf1B3vVbv0GuKioPoBlHJdB5dr5NyfOsSI
Lr3c991CRCT1Ou17xjRCRAxMuNR/An0g8CEXssFvnXdVPUQTgsdEUkCLIPVhkAVaYwZ5To74FgDHDs6+OO4QO7V0h
1K6EbF+KQyK2zjnefErJ7Qj173PRIGeD7Be1FxIxa6l8mfQN8ITBORlpwgvwL4h94biEgmUK+qXuAO4NFAF2qMOQU6O
6ClHlrq/AvnrhBvdw98TlmauHEQnwZxqRCbBAnpvVq/vlZs1+tb1ydCROSp+56cgNerNLd7aGnvPknNQ3Obh+a2Tue
5ved193vtzvLKMMydw7tTMgNczaKCrqkdEbgReBCKBR1V1m4jcB2xS1Q3AluBHIql4XS7fDnIlxpih8XqhtcEJ534fVuBuPt
Kz3NY48PEiopxQ7nqk5MH42cev6+8RmzLqWruqSnN7J65jHbhaO3Ad8/R63YGr1Vl2t3YFsy+cfa+b2jpp8QW5vxJilk
mliSlpNpLfxdkj8nVjsG4SXVpaqjbbojFD1N4C7ipoOuW8u6uhufb4gO56HDS6cDdGVBwkZDot5YSMPo/OnufewRyTB
CKn9usdQfLuHfw9hfl3WHD2uf1sQ68g0RffHQkyXFRJMVGkRABSWKM8zoxNopE33JibM/7SbFRJMb0et31ni/IlyMC
870Tkc2qWtrfe0GbPtcY00t7CzRVg7tXUDdVO89dy+7D/begI6KOD+Ts4l7LmX1C2velStj1X2MvnV7FPUDYuvsJY3ef
MG5q8wwaylkxkaTER5MSF01KfBTjk+OYlh1NSlwUKfHRJMDf+d7r2aZrOTkuiujl0fVxhT8s0lOZSd5OpzXdWAmug75g
7hPUTdXQ2k9QR8ZAco4zqiJrkz+PCSPH+TcnvXJOU7rOUgtZ1XF1eqhoaWdoy0dHG1p52iz89pZ51vvW9fY0o6r1eIT
HkxybK/gjY8mb1wcM+OSfQEcRXKvEE6OiyY1vmc5KUQD+WRZObSzXKpOH3XjQV9gVzrPJZU969yHwNsnvCJjesl4aw
ZMPt95nZzrjE/uCuxTHNSqSIObhyNN7Rxpao+uf24oG5o7qC+pWdd13PnAE3ICIHU+GjSEmNIS4ghf1wcs/NS+m0N
912XFBu4LoqxxALdmlF42pxW9XEhfaCntd1Y6YyT7i0i2jIzmDoBJp0DqfmQWuAsp+Q5YX0Kg1pVaTzWwZGmNmrdT
IB3P7qWm9s54nbWtXn673OPiYxgXEI06YkxjEulZlp2EuMSYkhPjCYtiYZxCTGkJUT71jmvU+KiibBQPqUs0M3Y1tYEdbv
6PD51wrq55rPbJ2Y5AZ0x1ekCSS04/pGYfUpGdDS1eahubOWwq5VaXjX9g5p36OuqR1PPy3oyAghPTGGzKRYMPNi
mJKZSGZyLBld65JJSU+Ilc0X2AkxkcgOOSfQbmaBbsJfpwca9vUE9pFPel67q3ptKE5LOmMy5Cz1tarze8l6JR+i40a2VK9
S19RGtau1O7Cd123drw83tuLupw86JjKcZKQYMPJiyU6OZVZuCPnJsd2hnZUUS4bvdVpCjLWew5AFugkPqs546rpPeo
X2p85y/Z7j59qIGweZ05wWdsYU53XGVEif7FwlOEKOtXf2E9S+h8tZV+Nu+0yfdGSEKJ0cy/iUOKZIJ/G5qZnkpMaRkxL
H+JQ4slOc0E6Ji7JW9BhngW5Ci7fTcejaCqjd3tPaPrLr+CF9kTGQPgUyp8PMLzmBneEL7sSMESINVtnS1M7++mb21b
X4Hs3sq29hf10Ldc3tn9knOTak8b5wnjllk5zU2O6g7grtjKRYO0Fo/GKBbkYnbycc3Qs1Fb7w3gE12+HITuhs69kupQAY
p8JpK3oCO3Oq010yApeHd3qVQw3HnLCub2Z/V3DXt7C/rpnmXlcOikBeajyTMhL4wuzxFKQlKNMV1L6wToy1X0ETO
PbTZILL64WgVU5Y11b0PB/5xJI9r0vqRGeI35RFkFUM2TMhc4YzL0iAtXZ0cqC+J6j31Tkt7v31LVQebaGjs6dLJCyggnp
8UzKSGRHUTqTMhlozEhkYkYCBWnxxEaNjjlHzNhggW5ODa/XOTFZu915dAV37U7wHOvZLqXACeui850rHrOKIW6s6x
CaPQEnK/voWtle72F7tZnuVm+3VLvbVt9B7Rozk2CgmZiRQnJvM0jk5TEpPYGJGApMyEslJibPuEDNqWKCbwPN2Oi3
sQx/CwQ/h0N+gptyZl7pLsr7T4i79mhPgWcXOclzKiJR0tLndCe1qlxPch93srHZrMPplhGBwoxEZuaksPz0floynVZ2YU
YiaQnRdrLRhAQLdHNyVKF+txPaXY+qj3suullJgtzTYf61zuXr2V3BnT0i5bR5Ovm0ppnt1S52VLupqHazo9rFYVdPv3taQ
jQzc1K4YsEEZuYkMzMnhWnjkoilsV8HE9rsJ9j4T9W5QrKr1X3I99w1D0IUHOSUwOIXQd48yD/DOVE5AhfaqCrVrIYqq
lxUVLnZ4Wt9765t7r6QJiYyqqnZSZw7JZOZucnMyEmhOCeZrORYa3GbsGSBgbWVNst2l0h3nX1ZESUMxf27K9A3hl
OgGcXQ2T0iJRy2NXX1spGthxsZGtlA1sPNnKkqWcYYP64eGbmJHNh8Xhm5qYwMyeZoszEMTIBkxm7LNCNw9MOBz
fd/nd8Af43Z7lpAMTPlPl6odPqzpsH4+eM2FWTte42yg42sqWyka0HG9hS2UiN2+kyiRCYmp3E+dOzKclPYXZ+KtPHJ
5MaPzL/kRGTSizXyqvF6q3wJ63YM+bsO9d576O4FwxOXEH5H3TCe/cuSMYPBCgvrmdrb5WtxPgjVQ1OsMVRWByZ
iLnTs2kJD+V0wpSmZWXYn3dxgzAfjPGCIXnisrdbzgBvve/nTvagDOe+/R/cKZxnXSucZOEEDY0sHWg41sOdjgdJ9UNn
KwoWfIYfImcWpnNaQSol+anMzk8lyS68McZv9tsSzhorYfebPa3wromoUifAjC9B0XnOlyU34B+qtuyqaeL9PfVs3Fv
PRwca2FfXM2xxYnoCp08cxz+ePYmSglTm5KeSEmfdJsacDAv0cNJ8BP+7QvxN53hhODchqwrwCefD2IFAZ+P29Pppa
LKzt76ti4t56Ne49S75u7JDs5ljMmprHyZAmclj+OOfkpjEulCeJnG2Ms0ENbqww2v9vTCj+81VkfkyFn4Mzb3ACPKs4
4EMH2zydbKls5IM99by/p54P9x3tvq3YxPQELpiZzYKidBYUOpfD2zBBY0aeBXqoOboXyp+B7X+Byk2gnRAZCxPPggu
gsmLnAt5lgP7T9vc5uHD/Ue7A/yjAw20++5uM2N8MI+el8eCogWFKaTkzqyc4YbY/pngR4Kju6FbU9D+dPOkEJwQv
tztzjdKBMWBnw14dHmdl/XST0f7Kmn7JCLTq8SGSHMyUvhmrMncWZhOmcWppOWaNOxowGFuijVf0eJ8C3PQ1V
Hznr8s6AJffBrOWQVhjQj2vzdPLfnxzhjR21fLCnnh2H3QDEREVw+oRxfGvRFBYUpXPGxDSb8tWYUcp+M0eT+t09Lfg
qj511+fNhyQ98IT4poB/X0u7hjR21PF9Wzevba2hq85AYE0lpYrLTs9jQZEzhNCmgDumNPgV6CKyFHgQiAR+raoP9HI
/lvAbYJxvm9Wq+lyAaw1PdZ/2tMSrtzjr8kvhC/c7IT5uYkA/zTawWsVNTxfVsWbO2tp7fCskRjDJXNzWTonl7MnZxAT
ZZfLGxOKBg10EYKEHgKWAJXARhHZoKrlvTb7PvAHVX1YRGYBzwGFI1BveKj7FLY95QR5tW9kSsGZ8IX/4wvxCQH9uK
PN7bxcfpjny6r466462ju9jE+JZWXpBJbOyeXMwjSibM4TY0KePy30BcAuVd0NICJrgeVA70BXoGsi61TgUCCLDAthdk
H5U7DtmZ7hhQUL4O9+CMXLAh7iNa5WXiw/zAtIvby3u55Or1KQFs8150xi6Zxc5k0Y23d9Nybm+BPO+cCBXsuVwMI
+29wLvCQiNwGJwIX9HUHeVgGrACZODGxXwqjU6YEPfGufPQmHy5x1ExbC3/0Izi2D1lKAflzI0RZeKKvmhbJqNu8/iip

MzkrkG+dP5ql5uczOS7Hx4MaEsUCdFL0SeFxFyfoiZwP/KSJzVNXbeyNVXQOsASgtLdV+jhM+mmpg3deckKzcnLISIdzg
t8dT8gH7MniPNPF9WxQt1lWypdOYIn5mTzHcWT+eikhymZSDziBsZrvGT6AeB3v0BBb51vX0dWAqgqu+KSByQCdQ
EosiQs+8d+ON1zo0fvvywM/FVANW4Wvn9Bwd4vqyK7dXO8MK5BancvnQmF83JoTAzMacFZ4wJdF4E+kZgmogU4
QT5FUDfhNoPLAYeF5FIiA6oDWSHlUEV3vl/8Mq9zjxr66HnDkBO/yntU2seXM3T/3t1B1eL6WTOjr4lksnZND/rj4gH2
OMSY0DRroquoRkRuBF3GGJD6qqtE5D5gk6puAL4LPLcit+CcIL1WVcO7S6WvYw3wzLdh+7POSJVI/xawGx5v3neUX
735KS9XHCYmMoLLzyzg+s9Ntpa4MeY4fvWh+8aUP9dn3d29XpcD5wa2tBBS9TH84R+d6WqXPgALv3HSsxl6vccrO2r
41Zu7+WBvPanx0dz4+alcc04hmUmxASrcGBNO7ErRk6EKHz4Bz/0zJGbCdc/DhAUndch2j5cNHx9izVufsvNwE3mpcd
x98SxWnjbNlBrk3xpyQJcRwtbfAX74LHz8Jkz8Pl/3aCfVhamrzsPaD/fzHf++hqrGVmTnJ/GzLXC4+Lc9udGyM8YsF+nAc2
eV0sdSUw/mr4fzblGJ4853Uutt47K97+M/39uFu9XDW5HR+eGkJi6Zn2XBDY8yQWKAP1ban4JmbIDlacroOpvZ7Dd
Wg9hxpZs1bu1n/YSUdnV6Wzs7hf54/hdMnjAtwwcaYsclC3V+ednj5bnj/YWfelRWPd+tkZ48ONPCrNz/lhW3VREdGc
NkZBaw6bzJFNmLFGHOSLND90VgJf7wWKjfCwm86c5JH+X9TB1XljZ21/OrNT3lvdz0pcVF8a9EUrjmnkOxku7uPMSY
wLNAHs+tV+NMN4GlzWuWzvzKk3V8oq+bnr+xke7Wb3NQ4vv+Yq5YMJEK7FijAkwS5WBeDvhrR/DGw9AdjFc/gR
kThvSITbtreebv9vMIKwkrJiLsvm5tlc48aYEWOB3p/mOvjT9fDpazD3SvjSv0JMwpAO0drRye3rt5CXGs8z3z7XxpAbY0
acpUxfBz5w+subj8AID8Iz1wzrqS+HXt/Fp7XN/OZrCyzMjTgnhCVNF1V4/5fw0vchJR++/hLknT6sQ1VUuXj4JU+5dF4+
50/PCnChxhjTPww0Lq/cA399EGZ8Eb787xCfNqzDdHqV1eu3kBoFzV0XzwpwkcYYMzALdICOY7DxUWcEy98/dlITaz32
1z18XNnlL66cR1qi/0MbJTHmZNMQC4BPXoJ297D7y7vsr2vhJy/tYPHMBc45LTeABRpijzOAs0AHK1kNiNhSdN+xDqCp
3PrWVqIgl7v/KHJuHxRhzyImgt7lh54sw+8vDnmAL4l+bK/nvXUe4/aKZ5Kba3YOMMAeeBfqO58HTCnMuG/Yhatyt3P
9sOQsK07lqwcQAFmeMMf6zQN+6DIIKoGD4N6a4d8M2Wj1efnRZCRER1tVijAmOsR3oLfxW6asw51KIGN634sVt1Ty
3tZqbF09jSIZSgAs0xhj/je1Ar/gzeD3D7m5pPNbBXU+XUZybwqrzJge4OGOMGZqxHehl6yF9CuTOHdbuDzy/nSNNbfz
LZSV2mzhjTNCN3RRYH4a9bzut82EMMXxvdx2//2A/1/+PyZxWYHcZMsYE39gN9PKnQb3D6m5p7ehk9fotTMpl4JYL
p49AccYYM3Rj99L/svUwfg5kzxzyrj9/5RP21rXw5PULiY8Z/th1Y4wJpLHZQm/YDwfed0a3DFHZwUYeeXs3K0sncM7U
zBEozhhjhsevQBeRpSKyQ0R2icjqt7/mYh85HvsFJGGWJcaQGV/cp5nDy3QPZ1ebl+/hfTEGO78YvEIFGaMMMcM3aJeLi
EQCDwFLgEppo4hsUNXyrm1U9ZZe298EzBuBWgOnbD3kz4f0oiHt9sbe9h2yMUvv3oGqQnRI1ScMcYMjz8t9AXALIX
drartwFpg+Qm2vxL4fSCKGxHFPoHqLTDn74e0254jzf8Iz0snZ3D0jk2k6lxZvTxJ9DzgQO9lit96z5DRCYBRcBrA7y/SkQ
2icim2traodYaGGV/AsSZjMtPXt9NK2Kilrhv+eyRq80YY05CoE+KXgGsU9XO/t5U1TWqWqqqpVIZQbg1myqUrYNJ50J
Knt+7rd14gPf31PO9LxaTnRI3ggUaY8zw+RPoB4EJvZYLfOv6cwWjubvlcBkc2Tmk0S3Vja386LkKzp6cwcozJwy+gzHGB
lk/gb4RmCYiRSISgxPaG/puJClzgTTg3cCWGEBL60EiYZZ/3S2qyl3PINHe6eVHI5bYTSuMMaPaolGuqh7gRuBfoAL4g6p
uE5H7RGRZr02vANaqqo5MqSdJ1Qn0KZ+HxAy/dnluaZUvlx/m1iXTKcxMHOECJTHm5Ph1paiqPgc812fd3X2W7w1c
WSPg4GbngqJFd/i1eUNLO/dsKKMkP5Wvfv25owxuNMSYYxs6l/1vXQWQszPySX5vf/5ckjrZ08JuvLSDKZII0xoSAsZFU3
k7Y9hRMWwJxqYnu/vYntazbXMn/PG8ys/MG394YY0aDsRHo+96Bpmq/ZlZsafdxw5+2MjKzkX9aPO0UFGEMMYEx
NrpcytZDdCJM/7tBN/3pSzupPHqM/1p1FnHRNpOiMSZ0hH8LvbMDyp+BGRdBzllHqnx0oiHH/rqHqxZOZOOfk/0bCG
GPMaBH+gb77DThWP2h3S7vHy+3rtpCdHMFqi4Y+R7oxgxRb+He5IK13ToROXXzCzR55ezc7Drv59T+WkhxnMykaY0J
PeLfQO1qh4lkovgSiYk+46V+2VLGwKJOLZ40/RcUZY0xghXeg73oZ2t1+dbd8UuNm3sS0U1SYMcYEXngH+tZ1kJgFhee
dcLNPasvo6FRm5aWcosKMMSbwwjfQ29yw80Vnlq7IE58qKD/kAmBWrgW6MSZ0hW+g73gBPMf8upiovMpFXHQE
RTYBlzEmhIVvoJeth5R8mLBw0E0rqlzMyEkHMsKmxzXGhK7wDPSWetj1Csz+CkSc+EtUVcqrXMzKTT5FxrIjzMglz0Df/
ix4O6Bk8BtBVzW20tDSYf3nxpiQF56BXrYe0idD7umDbIpr5TshaiNcjDEhLvwCvakG9rzlnAz145ZxXSNcZuRyObtjQlv4
Bfq2p0G9fo1uAWeES2FGAkmx4T8LgJEmvIVfoJeth+zZkF3s1+YVVS7rbjHGhIXwCvSGA3DgPzhzqV+bN7V52FvXQrF1
txhjwkB4Bfq2p5xnPwN9R7WdEDXGhI/wCvSydZB3hjPCxQ9dJOSLbciiMSYMH+gH9kFVR/7fTIUnBOi4xKiyU2NG8HC
jDHm1AifQN/2J0D87m4BKK9yMys3BfJfjKMxxox24RHoqs5UuZPOgZQ8v3bxdHrZXuWy7hZjTnJwK9BFZKmi7BCRX
SKyeoBtLheRchHZiJPBrbMQdSUw5EdQ2qd761rps3jtUv+jTFhY9CraUQkEngIWAJUAhtFZIOqlvfaZhpwB3Cuqh4Vke
yRkrhfW9eBRDpzn/upvMoN2AgXY0z48KeFvgDYpaq7VbUdWAss77PNDcBDqnoUQFVrAlvmCag6FvNNXgSjMx7vV
n7IRXSkMCUracRKM8aYU8mfQM8HDvRarvSt6206MF1E/loi74nl0v4OJCKrRGSTiGyqra0dXsV9HfwQGvYNaXQLOCN
cpmUnExMVHqcRjDEmUGkWBuWDFgFXAo+IyLi+G6nqGIUtVdXsRkyswHxy2XqJlIGZXrSbnbJvzEm3PgT6AeBCb2W
C3zreqsENqhqh6ruAXbiBPzl8nY6wxWnLoH4z/z/MaBadxu17jYb4WKMCSv+BPpGYJqIFIIIDHAFsKHPNk/jtM4RkUycl
pjdAayzf/vfBXcVIAytu6V7DnQLdGNMGBk00FXVA9wlvAhUAH9Q1W0icp+ILPnt9iJQJyLlwOvAP6tq3UgV3a1sPUQn
wPR+u+wHVG6BbowJQ35NAq6qzwHP9VI3d6/XCtze5wanR1Q/gzMuAhiEoe0a/khF/nj4klNiB6h4owx5tQL3SEeu9
+Elrohj24Bp8vf+s+NMeEmdAO9bD3EpsLUC4e0W2tHJ5/WNJerN3mECjPGmOAlzUDvalXt20LxJRAVO6Rdd1S78apd
IWqMCT+hGei7XoE215DmbunSM8IIndBVGWNMUIVmoJeth4QMkDp/yLuWV7lIio2iIC1+BAozxpjgCb1Ab2uChc87
E3FF+jVI5zjlh1wU5yYTEWFzobTjwkvobfrOF8BzDEr+fsi7er3K9mq3jXAXxoSI0Av0yBiYshgmnDXkXQ8cbaGpzWMXFB
ljwtLQ+yyCbdYy5zEM3SdEbYSLMSYMHv4L/SSUH3IRITB9vi1BN8aEn7EV6FUupmQlERcdGexSjDEm4MZUoFdUua27
xRgTtsZMoDe0tH0w4ZiNcDHGhK0xE+g2Za4xJtyNmUCvqHIDWAvdGBO2xkyglx9ykZUcS1by0CbzMsaYUDF2Ar3KZd
0txpiwNiYcVd3jZVeNXfJvjAlvYyLQd9U00dGpNmTRGBPwXkSg2wgXY8xYMCYCvaLKRvX0BEWZQ7uZtDHGhJlxEejlh1

zMyEkh0uZAN8aEsbAPdFWlotpGuBhjwl/YB3pVYysNLR3MyrUZFo0x4S3sA738kM2BbowZG/wKdBFZKiI7RGSXiKzu5
/1rRaRWRD7yPa4PfKnD03VTixk5FujGmPA26B2LRCQSeAhYAIQCG0Vkg6qW99n0v1T1xhGo8aSUV7kozEggKTb0bs5
kjDFD4U8LfQGwS1V3q2o7sBZYPrJIBU55Icu6W4wxY4l/gZ4PHOI1XOIb19dIlrJFRNaJlT+DiQiq0Rkk4hsqq2tHUa5Q9
PU5mFfXQvF1t1ijBkDANvS9M9AoaqeBrwM/Ka/jVR1jaqWqmpVIZWgD56YNvtptDGmDHEn0A/CPRucRf41nVT1T
pVbfMt/hqYH5jyTk65BboxZgzxJ9A3AtNEpEhEYoArgA29NxCR3F6Ly4CKwJU4fBVVLSYIRJOTEhfsUowxZsQNOvRDVT
0iciPwlhAJPKqq20TkPmCTqm4A/klElgEeoB64dgrR9lv5lecKURG75N8YE/78Gsunqs8Bz/VZd3ev13cAdwS2tJPj6fSv
drN1WdNCnYpxhhzSoTtlaJ765pp83jtpbhGmDEjbAN9m13yb4wZY8I20Cuq3ERHClOykoJdijHGnBjhG+jlVS6mZScTEx
W2X6lxxhwnbNOu/JBd8m+MGVvCMtBr3K0caWqzE6LGmDEILAO9osoN2E2hjTfJ51gGevdNLSzQjTfJfSfgGekWVi/xx
8aQmRAe7FGOMOWXCMtDLq1zWf26MGXPCLtBbOzrZXdtkN4U2xow5YRfoO6rdeNWuEDXGjD1hF+jdc6Dnpga5E
mOMObXCLtArqlwxUZRkBYf7FKMMeaUCrtALz/kojg3mYglmwPdGDO2hFWge71KRZXLxp8bY8aksAr0A0dbaG7vtC
GLxpgxKawCvdzmQDfGjGHhFehVLiljhOnjbQy6MWbsCatAr6hyMTkzkbjoyGCXYowxp1xYBbrNgW6MGcvCjAbWto
51NhqJOSNMWNW2AR6zxWiFujGmLEpfAlDn8LFWujGmLEqBAK9ospNVnIsWcmxwS7FGGOCwq9AF5GllrJDRHaJy
OoTbHeZiKillAauRP+U2xWixpgxbtBAF5FI4CHglmAwwCKWlZOpnu2TgZuD9QBc5mHaPl101bhvhYowZ06L82GYBsEtV
dwOlyFpgOVDeZ7sfAP8C/HNAK/TDrpomOjrV+s+NOQkdHR1UVlbS2toa7FIMEBCXR0FBAdHR/t9K059AzwcO9FquB
Bb23kBEzgAmqOpfRGTaqBeRvcAqglkTJ/pd5GBshlsxJ6+ySpLk5GQKcwsRsdLkg0lvqauRO7KyKqKilr/3O+mToiISafwr
8N3BtlXVNapaqqqlWacCw88AAA5nSURBVFIzI/vR3coPuYiljQAOmZfgxzRmrGltbSUjl8PCfBQQETlyMob815l/gX4Q
mNBruc3RksyMAd4Q0T2AmcBG07lidGKKhcZclKItDnQjTkpFuajx3D+LfwJ9I3ANBEpEpEY4ApgQ9ebqtqoqpmqWqiq
hcB7wDJV3TTkaoZBVW2EizHG4Eegq6oHuBF4EagA/qCq20TkPhFZNtIFDuZQYyuNxzqYlWszLbpjxJZ/Toiqqs8Bz/VZd/
cA2y46+bL8V2FzoBtjhsjj8RAV5Vf8hZSQ/4rKq1ylwlwcC3RjAuV//3lb93QagTlrL4V7Lpk96HZf/vKXOXDgAK2trdx888
2sWrWKf154gTvvvJPOzk4yMzN59dVXaWpqq4qabbmLTpk2ICPfccw+XXXYZSUIJNDU1AbBu3TqeffZZHn/8ca699Iri4u
L429/+xrnnsVv1zBzTffTgrK/Hx8Tz22GPMmDGDzs5Obr/9dl544QUiliK44YYbmD17Nr/4xS94+umnAXj55Zf593//
d5566qmAfo9OVugH+iEXk9ITSIoN+S/FGAM8+uijpKenc+zYMc4880yWL1/ODTfcwFtvvUVRURH19fUA/OAHPyA1NZ
WtW7cCcpTo0UGPXVIZyTvvvEnkZCQul4u3336bqKgoXnnlFe68807Wr1/PmjVr2Lt3Lx999BFRUVHU19eTlPbGt771L
Wpra8nKyuKxxx7ja1/72oh+H4Yj5FOwotrFbOtuMSag/GljJ5Rf/OIX3S3fAwcOsGbNGs4777zu8djp6ekAvPLK6xdu7Z
7v7S0tEGPvWLFcIlnRvgNDY2cs011/DJJ58glNROdHQf9xvf+EZ3l0zX51199dX89re/5brrruPdd9/liSeeCNBXHDghHeju
1g721bWwYn5BsEsxxgTAG2+8wSuvvMK7775LQkICixYt4vTTT2f79u1+H6P3cl++47gTE3uuVbnrrrv4/Oc/z1NPPcXev
XtZtGjRCY973XXXcckllXAXF8eKFStGZR98SM+2uKPaDdiUucaEi8bGRtLS0khISGD79u289957tLa28tZbb7Fnzx6A7i6XJ
UuW8NBDD3Xv29XIMn78eCoqKvB6vSfs425sbCQ/Px+Axx9/vHv9kiVL+NWvfoXH4znu8/Ly8sjLy+P+++/nuuuuC9wX
HUAhHejdl/xbl4sxYWHpOqV4PB6Ki4tZvXo1Z511FIIZWaxZs4ZLL72UuXPnsnLISgC+/3vc/ToUebMmcPcuXN5/fXXAX
jggQe4+OKLOeccc8jNzR3ws2677TbuuOMO5s2b1x3eANdffzOTJ07ktNNOY+7cuTz55JPd71111VMMmDCB4uLiEfoO
nBxR1aB8cGlppQ7adHLXHq1ev4UXtlXzt7uW2BVuxpykioqKURtUo8WNN97lvHnz+PrXv35KPq+/fxMR2ayq/V6JP/o
6gYagwneFqlW5MWakzZ8/n8TERH76058Gu5QBhWygezq9bK92c/VZk4JdijFmDni8eXOWSxhUyPah7znSTJvHaydEj
THGJ2QD3U6IGmPM8UI60GMil5iSIRtsUowxZlQI3UA/5GJqdhIxUSH7JRhjTECFbBpWVNINoY0xpreQDPQadytHmtrs
hKgxY1hSknW39hWSwxYrqpXl/uOuRcaMkOdXQ/XWwB4zpwQueiCwxxwFRtPc6iHZQu+ap9kC3ZjwsXr16uPmZrn3
3nu5//77Wbx4MWeccQYIJSU888wzfh2rqalpwP2eeOKJ7sv6r776agAOHz7MV77yFebOncvcuXN555132Lt3L3PmzO
ne7yc/+Qn33nsvAlsWLeI73/kOpaWIPPjgg/z5z39m4cKFzJs3jwsVjDDhw9313HddddRUILCaaedxvr163n00Uf5zne+
033cRx55hFtuuWXY37fjqGpQHvPnz9fhuvHJD/WcH7067P2NMZ9VXI4e1M//8MMP9bzzutelLi4u1v3792tjY6Oqqtb
W1uqUKVPu6/WqqmpiYuKAx+ro6Oh3v7KyMp02bZrW1taqqmpdXZ2qqI5++eX6s5/9TFVvPR6PNjQ06J49e3T27Nn
dx/zxj3+s99xzj6qqnn/+frNb36z+736+vruuh555BG99dZbVvX1tttu05tvvmm47dxut06ePFnb29tVvfxss8/WLVu29Pt
19PdvAmzSAXJ1dPydMEQVVS7rPzcmzMybN4+amhoOHTpEbW0taWlp5OTkcMstt/DWW28RERHBwYMHoxZ4MD
k5OSc8lppy5513fma/1157jRUrVpCZmQn0zHX+2muvdc9vHhkZSWpq6qA3zOialAycG2esXLmSqqoq2tvbu+duH2jO
9gsuulBnn32W4uJiOjo6KCKpGeJ3q38hF+jH2jvZXdvEF0sGnkXNGBOaVqxYwbp166iurmblypX87ne/o7a2ls2bNxMd
HU1hYeFn5jjvz3D36y0qKgqv19u9fKK51W+66SZuvfVWli1bxbhtvNHNTOQ66+/nh/+8lfMnDkzoFPxhlwf+o7DbrwK
s3KTg12KMSbAVq5cydq1a1m3bh0rVqygsbGR7OxsoqOjef3119m3b59fxxlovwsuulA//vGP1NXVAT1znS9evJiHH34Y
gM7OThobGxk/fjw1NTXU1dXR1tbGs88+e8LP65pb/Te/+U33+oHmbF+4cCEHDhzySef5Morr/T32zOokAv0iq5L/nN
Tg1yJMSbQZs+ejdvtJ8/n9zcXK666io2bdpESUkJTzzxBDNnzvTrOAPtN3v2bL73ve9x/vnnM3fuXG699VYAHnzwQV5//
XVKSqYp38+5eXlREdHc/fdd7NgwQKWLFlyws++9957WbFiBfPnz+/uzoGB52wHuPzyyzn33HP9unWev0JuPvSxtlWz
bnMlv/zqfClibNpcYwLF5kM/tS6++GJuueUWFi9ePOA2Q50PPeRa6F+YncOafyy1MDfGhKSGHgamT59OfHz8CcN8OE
LupKgxntZunVr91jyLrGxsbz//vtBqmhW48aNY+fOnSNyL8CXUSWAg8CkcCvVfWBPu9/A/g20Ak0AatUtTzAtRpjRpi
qhtQdwEpKSvjoo4+CXcalGE53+KBdLiISCTwEXATMAq4UkVI9NntSVUtU9XTg/wL/OuRKjDFBFRcXR11d3bCCxASWql
JXV0dcXNyQ9vOnhb4A2KWquwFEZC2wHOhugauqq9f2iYD9RBgTygoKCqsrKS2tjbYpRic/2ALCgqGtl8/gZ4PHOI1XA
ks7LuRiHwbuBWIAS7o70AisgpyBTBx4sQhFWqMGVnROdHdVzia0BSwUS6q+pCqTgFuB74/wDZrVLVUVUuzsrIC9dH

GGGPwL9APAhN6LRf41g1kLfDIkynKGGPM0PkT6BuBaSJSJClxwBXAht4biMi0XotfAj4JXInGGGP8MWgfuqp6RORG4
EWcYYuPquo2EbKpZxrHDcCNInIh0AEcBa4Z7LibN28+liL+TczwWZnAkWHuGwyhVG8o1QqhVW8o1QqhVW8o1Qon
V++kgd4l2qX/J0NENg106etoFEr1hIKtEfr1hIKtEfr1hIKtMHL1htyl/8Yyy/pngW6MMWEiVAN9TbALGKJQqjeUaoXQqj
eUaoXQqjeUaoURqjck+9CNMcZ8Vqi20IOxxvRhGw6MMWEi5AJdRJaKyA4R2SUiq4Ndz0BEZIKivC4i5SKyTURuDnZN/
hCRSBH5m4gMfAPFUUBExonIOhHZLiIvInJ2sGs6ERG5xfdzUCYivxeRoU2jN8JE5FERqRGRsl7r0kXkZRH5xPccuHulnY
QBav2x72dhi4g8JSLjgljl/5q7fXed0VERSSzv32HI6QC3c+pfEcLD/BdVZ0FnAV8exTX2tvNQEWwi/DDg8ALqjoTmMsor
lIE8oF/AkpVdQ7OBXpXBLEqz3gcWNpn3WrgVvWdBrzqWx4NHueztb4MzFHV04CdwB2nuqgBPM5na0VEJgBfAPYH
8sNCKtDpNZWvqrbjzBuzPMg19UtVq1T1Q99rN07g5Ae3qhMTkQKcQrt+HexaTkREUoHzgP8AUNV2VW0IbIWDigLiR
SQKSAAObbme46jqW0B9n9XLga5b2P+GUTJHU3+1qupLqurxLb6HM+dU0A3wfQX4GXAbAZ5qPNQCvb+pfEd1SAKI
SCEwDxi998Vy/BznH8wb7EIGUQTUAo/5uod+LSKJwS5qIKp6EPgJTmusCmhU1ZeCW5Vfxqtqle91NTA+mMUMwde
A54NdxEBEZDIwUFU/DvSxQy3QQ46IJAHrge/0uRHlqCfiFwM1qro52LX4IQo4A3hYVecBzYye7oDP8PU9L8f5jygPSBS
Rrwa3qqFRZ3zzqB/jLCLfw+nu/F2wa+mPiCQAdwJ3j8TxQy3QhZqVb1CJSDR0mP9OVf8U7HoGcS6wTET24nRIXSAiv
w1uSQOqBCpVtesvnnU4AT9aXQjsUdVaVe0A/gScE+Sa/HFYRHIBfM81Qa7nhETkWuBi4CodvRfYTMH5j/1j3+9aAfCh
iOQE4uChFuiDTuU7Wohzp93/ACpUddTfY1VV71DVAIUtxPm+vqaqo7IVqarVwAERmeFbtZhet0QchfYDZ4IlgU/nYjGj
+CRuLxvomTn1GuCZINZyQr4b2d8GLFPVImDXMxBV3aqq2apa6PtdqwTO8P1Mn7SQCNtfsY+uqXwrgD+o6rbgVjWg
c4GrcVq6H/keXwx2UWHkJuB3IrlFOB34YZDrGZDvL4l1wlFvPzfu1F1qbql/B54F5ghlpUi8nXgAWCJiHyC81fGA8Gssc
sAtf4bkAy87Ptd+2VQj/QZoNaR+7zR+5eJMcaYoQipFroxpiBWaAbY0yYsEA3xpgwYYFujDFhwgLDGGPChAW6McaE
CQt0Y4wJE/8f/xpBZBjf2BoAAAAASUVORK5CYII=\n"

```
    },
    "metadata": {
      "needs_background": "light"
    }
  }
],
{
  "cell_type": "markdown",
  "source": [
    "*** (ii). Evaluate the Model ***"
  ],
  "metadata": {
    "id": "Y_cyHOlf6BfX"
  }
},
{
  "cell_type": "code",
  "source": [
    "model.evaluate(x_test,y_cat_test,verbose=0)\n",
    "    #loss      |      #accuracy"
  ],
}
```

```
"metadata": {
  "colab": {
    "base_uri": "https://localhost:8080/"
  },
  "id": "41Qqd4Yc6D_x",
  "outputId": "9b1cd3a3-acc5-442a-e83c-ea70725e4ddb"
},
"execution_count": 32,
"outputs": [
  {
    "output_type": "execute_result",
    "data": {
      "text/plain": [
        "[0.38445618748664856, 0.8982999920845032]"
      ]
    },
    "metadata": {},
    "execution_count": 32
  }
],
{
  "cell_type": "code",
  "source": [
    "from sklearn.metrics import classification_report,confusion_matrix\n"
  ],
  "metadata": {
    "id": "Cr8YXoi66TOH"
  },
  "execution_count": 33,
  "outputs": []
},
{
  "cell_type": "code",
```

```

"source": [
  "predict_x=model.predict(x_test) \n",
  "classes_x=np.argmax(predict_x,axis=1)"
],
"metadata": {
  "colab": {
    "base_uri": "https://localhost:8080/"
  },
  "id": "ndMmqFio6Xzg",
  "outputId": "34d57cdf-d602-456d-c87f-e8ea9afdff71"
},
"execution_count": 34,
"outputs": [
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "313/313 [=====] - 2s 7ms/step\n"
    ]
  }
],
},
{
  "cell_type": "code",
  "source": [
    "print(classification_report(y_test,classes_x))"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    },
    "id": "Smjbiow461r_",
    "outputId": "3ab67bc1-8686-4eb1-d9b5-fdf6535c1eda"
  },
}

```

```

"execution_count": 35,
"outputs": [
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "      precision  recall f1-score  support\n",
      "\n",
      "    0    0.93    0.97    0.95    980\n",
      "    1    0.95    0.98    0.96   1135\n",
      "    2    0.90    0.87    0.88   1032\n",
      "    3    0.88    0.89    0.89   1010\n",
      "    4    0.90    0.91    0.90    982\n",
      "    5    0.90    0.81    0.85    892\n",
      "    6    0.91    0.93    0.92    958\n",
      "    7    0.92    0.87    0.89   1028\n",
      "    8    0.84    0.86    0.85    974\n",
      "    9    0.85    0.88    0.87   1009\n",
      "\n",
      " accuracy                0.90  10000\n",
      " macro avg    0.90    0.90    0.90  10000\n",
      "weighted avg    0.90    0.90    0.90  10000\n",
      "\n"
    ]
  }
],
},
{
  "cell_type": "code",
  "source": [
    "print(confusion_matrix(y_test,classes_x))"
  ],
  "metadata": {
    "colab": {

```

```
"base_uri": "https://localhost:8080/"
},
"id": "UnGPzaoK68GO",
"outputId": "de23be86-6f89-418a-ddad-6319b467119d"
},
"execution_count": 36,
"outputs": [
{
  "output_type": "stream",
  "name": "stdout",
  "text": [
    "[[ 954  0  4  4  0  2  6  1  7  2]\n",
    "[ 0 1109  3  4  1  1  4  0 13  0]\n",
    "[ 13  4 894 15 18  0 23 20 44  1]\n",
    "[  3  1 22 903  0 33  4 16 23  5]\n",
    "[  1  3  3  0 892  0 21  2  6 54]\n",
    "[ 12  5  5 53 17 720 20  1 41 18]\n",
    "[ 14  6 12  2 10 19 887  1  7  0]\n",
    "[  1 19 33  3 12  0  1 895  9 55]\n",
    "[ 10  9 12 29  7 23  8 17 841 18]\n",
    "[ 15 10  6 14 36  4  0 25 11 888]]\n"
  ]
}
]
},
{
  "cell_type": "code",
  "source": [
    "import seaborn as sns\n",
    "plt.figure(figsize=(10,6))\n",
    "sns.heatmap(confusion_matrix(y_test,classes_x))"
  ],
  "metadata": {
    "colab": {
```

```
"base_uri": "https://localhost:8080/",
"height": 391
},
"id": "QFJ5vVS37CV6",
"outputId": "f3387997-db95-4e27-8577-e25cbeb38604"
},
"execution_count": 37,
"outputs": [
{
"output_type": "execute_result",
"data": {
"text/plain": [
"<matplotlib.axes._subplots.AxesSubplot at 0x7f8847a34290>"
]
},
"metadata": {},
"execution_count": 37
},
{
"output_type": "display_data",
"data": {
"text/plain": [
"<Figure size 720x432 with 2 Axes>"
],
"image/png":
"iVBORw0KGgoAAAANSUHEUgAAAioAAAFICAYAAADF1sOXAAAAABHNCSVQICAgIfAhkiAAAAAlwSFlzAAALEgAACxIB
0t1+/AAAADh0RVh0U29mdHdhcmUAAbWF0cGxvdGxpYiB2ZXJzaW9uMy4yLjlsIGh0dHA6Ly9tYXRwbG90bGliLm9yZ
y+WH4yJAAAds0IEQVR4nO3de5Cld13n8fdnZnKbSchwcWMyM25iiZcs7kLIBlYkyxrFgBTDusiCLsSYtdFFLu5WacStSrle
ilQhGGqVdUiAICEBAxQpDQhyU9clMAIBc0EZlpAZcgFzlyRxMtPf/eM8kc4w3adPnz79XPr9Sj015zyXfr59Mpdvf3/f3+
9JVSFJktRFG9oOQJlkaTEmkPlkqbNMVCRJUmeZqEiSpM4yUZEKsZ1loiJkjp06xv8OAH39Sr+c/H7byw7RCkdSttBzCh
Xv3l1vAzXhsH9u9b04/64a/fMtVHdcQTvrzuzvVmnhqHlkqQZmz/YdgQz49CPJEnqLCsqkiT1Xc23HcHMmKhIktR38yYqk
iSpo2rAFRV7VCRJUmdZUZEKqe8c+pEkSZ014KEfExVJkvpwuOuomKhIktR3A66o2EwrSZI6y4qKJEl9ZzOtJEnqqiGvo2K
ilKs363nikqS7wd2AtuaXfuAq6rq5lkGJkmSlmnAFZUlm2mT/CpwBRDg080W4PIk5y9x3VyS3UI2X/LBv17NeCVJ0joyr
qJyHvCvqurhhTuTvAG4EXjd4S6qqI3ALoAHP/imWoU4JUnSYtbxOirzwEnAlw/Zf2JzTJlktW3AQz/jEpXXAB9N8gXg1m
bdfdWHfA/zSLAOTJEnLtF6baavqQ0m+FziDRzftFqaqhltnkiRJnTB21k+NJmd/ag1ikSRJK7GOH34kSVLXrdehH0mS1H1D
7sYwUZEKqe8GPPTj05MISVJnWVGRJKNv7FGRJEmd5dCPJEnqrPmD021jJHlRkjuT3LBg3+OSfCTJF5pfH9vsT5I3JdmT5
G+SnLbgmnOa87+Q5JzlfGsmKplk9V3NT7eN93bg7EP2nQ98tKqeCHy0eQ/wHOCJzTYHvBlGiQ1wAfA0RgvJXvBlcrM
UExVJkrSkqvoL4K5Ddu8ELm1eXwq8YMH+d9Tlp4CtSU4Efzh4SFxdVVV3Ax/h25Ofb2OPiiRJfddOM+OJVXVb8/p24IT
m9Ta+9XxAgL3NvsX2L2nmicpxOy+c9S1W1YNf/cu2Q5jYMSc9s+0QpFVRbQewDmzY0K9C+sEBz2ZZVVM20yaZYzR
```

M84hdVbVr2bevqiQz+SNsRUWSpL6bMqFrkpJlJyaNO5KcWFW3NUM7dzb79wE7Fpy3vdm3D3jWlfs/Me4m/UqtJUI
SV1wFPDJz5xzgAwv2v6yZ/fN04N5miOjPgGcneWzTRPvsZt+SrKhIktR3Mx4iS3I5o2rIE5LSZTR753XAE5KcB3wZeFFz+t
XAc4E9wAPAUQBvdVeS3wQ+05z3v6rq0Abdb2OiklS2836oYRV9ZJFDp11mHMLemUIX+etwFsnubeJiiRJftgpmMTF
UmS+s4I9CVJktaeFRVJkvrOoR9JktRZAx76MVGRJKNvrKhIkqTOGNBfxWZaSZLUWVZUJEnqO4d+JEISZ5moSJKkzrJH5
dslOXc1A5EkSTrUNM20v7HYgSRzSXyn2TO//80pbifJksaan59u67Alh36S/M1ih4ATFruuqnYBuW2HbmtVhydJEkab8
BDP+N6VE4Afhy4+5D9Af56JhFjkqTJdLwqMo1xicqfAMdW1fWHHkjyiZIEJEmSjrNeKypVdd4Sx3569cORJEn6FqcnS5
LUd+t46EeSJHWdiYokSeqsGu4EWxMVSZL6bsAVFZ+eLEmSOsuKiiRJftgqioqJiiRJfbde11GRJEK9MOCKij0qkiSps6yoSJ
LUd05PXrmNG/pVtDnmpGe2HcLEvvGWl7YdwsS2vvytykOYSEjbiUzswPzBtkOY2BEb+/WzU/XwH4dJnH3ZdggT+cb+
B9sOoR8GPPTTr78VJEnStzNRkSRJnTXgWT/9GpeRJEnrihUVS2J6rub71y+1XCyqkiT1nT0qkiSpswbc02KilklS3w146M
dmWkmS1FIWVCRJ6jt7VCRJUmeZqEiSpM7q4eMclsseFUms1FIWVCRJ6juHfiRJUmCNeHqyiYokSX034AXfxvaolPn+J
GclOfaQ/WfPLixJkrRs8zXd1mFLJipJXgV8AHglcEOSnQsO/84S180I2Z1k98GD969OpJlkad0ZN/Tz88BTq+r+JCCdVYy5
uaouArLYRVW1C9gFcNTRO7qdqkmS1HO1jptpN1TV/QBV9aUkz2KUrPxLlkHUEJnSGur48M00xvWo3JHkyY+8aZKW5
wFPAH5wloFJkqRlqvntpg4bl6i8DLh94Y6qOIBVLwPonFIUkiRJbN6bqaq9Sxz7v6sfjiRJmtg6HvqRJElDnZ8/3TZGkl9Ocm
OSG5JcnuToJKckuSbJniTvTnJkc+5Rzf9zfGTp/nWTFQkSeq7Ga6jkmQb8Crg9Kp6ErArEdFwlfDGqvoe4G7gvOaS84C
7m/1vbM5bMRMVSZL6bvbNtJuAY5JsAjYDtwE/AlzZHL8UeEHzemfznub4WUJWPFYREWSJC2qqvYBrwe+wihBuRe
4Fringq40p+0FtjWvtwG3NtceaM5//Ervb6liSVLFTtn0s3BF+Wabe+RLJ3ksorJKcBJwBZgzR6j40MJJUnquWIXpl24ovx
h/CjwD1X1NYAk7wOeAWXnsqmpmmwH9jXn7wN2AHuBoalJgX9caWxWVCRJ6rvZPpTwK8DTk2xuek3OAm4CPg68
sDnnHEbPBgS4qnIpc/xjVbXi+dNWVCRJ6rsZrqNSVdckuRK4DjgAfJZR9eVPgSuS/Faz75LmkkuAP0qyB7iL0QyhFTNRkS
RJS6qqC4ALDtI9C3DGYc59CPip1bq3iYokSX3X8ef1TGPmicrBAT96uise9wuXtx3CxO65+GVthzCR437u7W2HMLGjNx
3ZdggTe+jA/rZDmMjGDf1r83vo4MNthzCRFS++sd4MeAl9KyqSJPVcDThR6d+PA5lkad2woiJJUt8NuKJioJJUt8NuB/U
REWSpL6zoiJJkprwlmKzbSSJKmzrKhIktRzUzxKp/NMVCRJ6rsBD/2YqEiS1HcmKplkqatcmVaSJkkFVIQkSeq7AVdUTF
QkSeq74S5MOz5RSXIGUFx1mSSnAmcDn6+qq2cenSRJGmviPspLjipJLgCeA2xK8hHgacDHgfOTPKWqfnsNYpQkSevU
ulrKC4EnA0cBtwPbq+q+JK8HrgEOm6gkmQPmALLxeDZs2LJ6EUuSpEdbrxUV4EBVHQQeSPLFqroPoKoeTLLoiFhV7QJ
2AWw6cttwPz1JkrpgHfeo7E+yuaoeAJ76yM4kxzPojOWSpP5Ytz0qWJlV9U8AVbUwMTkCOGdmUUmSpOUbcOlgyUT
lkSTIMPu/Dnx9JhFJkiQ1XEdFkqSeW89DP5lkqevW69CPJEnqvJrKSRJnTXgRMWnJ0uSpM6yoiJJUs859CNJkrRLREWS
JHXVkcSq9qhIkqTOsqliSVLPDbmiYqliSVLPmaio0x4+eKDTECZ23M+9ve0QJvKNP/yZtkOY2HEvv6ztECa2acPGtkOYyIH
5g22HMLH5nnVdHn/0lrZD6ldK2xHMjImKJEK9N+SKis20kiSps6yoSJLUczXv0l8kSeqoIQ/9mKhIktRzZTOtJEnqqiFXVGy
mlSRJnWVFRZKknrOZVPlkdVZV2xHMjomKJEK9N+SKij0qkiSps6yoSJLUc0OuqJioSJLUc/aoSJkzhpyRWXiHpUk75hFIJ
lkaWWqMtXWZUtWVJJcdegu4D8k2QpQVc9f5Lo5YA4gG49nw4YtqxQJElqS/Nv/8XAk4ACfg74O+DdwMnAl4AXVd
XdSQJcBDwXeAD42aq6biX3HTf0sx24qQmsGCUqpwo/u9RFVbUL2AWw6chtAx45kySpfWu0hP5Fwleq6oVJjgQ2A6
8FPIpVr0tyPnA+8KvAc4AnNtvTgDc3v05s3NDP6c1wK8D91bVJ4AHq+qTVfXJldXQkiStrvnKVN4s4SY4HzgQuAaiq/VV
1D7ATuLQ57VLgBc3rncA7auRTwNYKJ67ke1uyolJV88Abk/xx8+sd466RJEIra9o+k4UtG41dzejI04Bvga8Lcm/YVTEd
VwQlX1pxzO3BC83obcOuC6/c2+25jQstKOqpqL/BTSX4CuG/Sm0iSpNmZdtbPwpaNRWwCTgNeWVXXJLmi0TDPw
q9RSVa93WOiWT9V9adV9drVdkSJHXAxBvV3TvL+SUeJyxyNDOs2vdzbH9wE7Fly/vdk3MZfQlySp56qm28Z//bo
duDXJ9zW7zml02eYq4Jxm3znAB5rXVwEvy8jTgFw5TjzsA/abSJLUe2u04NsrgcuaGT+3AOcyKni8Jl5wJeBFzXnXs1oa
vleRtOTz13pTU1UJEnqueXM3JIWV3PaDbwoc46zLkFvGI17uvQjyRJ6iwrKplk9VzXl8GfhomKJEK959OTJUISZ61Fj0p
bTFQkSeq5IQ/92EwrSZI6y4qKJEK9Z4/KFDakX+WoGvL/7Q45/ugtbYcwka2/eHnblUzs6//pe9sOYWLf+f4vth3C4G0+8
ui2Q5Jl/fsfajuEXrBHRZIkddaQe1RMVCRJ6rkHv1RspUkSZ1IRUWSpJ4bcneliYokST035KEfExVJknpuYm209qhIkqTOs
qliSVLPzbcdwAyZqEiS1HPFcld+TFQkSeq5+QFP+zFRkSSp5+YHXFGxmVaSJHWWFRVJknrOHhVJktRZzvqRJEmdZUWI
keSHgTOAG6rqw7MJSZikaWTJZtokn17w+ueB/w0cB1yQ5PwlrptLsjvJ7vmD31y1YCVJ0rebn3LrsnGzfo5Y8HoO+LGq
+g3g2cDPLHZRve2qqTOr6vQNG7esQpiSJGkxQ05Uxg39bEjyWEYJTaqawBV9c0k82YenSRJGms996gcD1wLBKgj1b
VbUmObfZJkqSWzQ/4X+QIE5WqOnmRQ/PAf1z1aCRJkhZY0fTkqnoA+IdVjkWSJK3AkJfQdx0VSZJ6bsDPJDRRkSSp77
o+c2caJiqSJpXcfiY79OPTkyVJUmdZUZEKqefsUZEKsZ1lj4okSeqsIS/4Zo+KJEnqLCsqkiT1nAu+SZKkzKZdgrp2dzuqv79
7+7bZwxwz0PfbDuEiWzo4Wf8ne//YtshTOzu339R2yFM5LhfvLztECb2wP6H2g5hlv37G7kdQ+5RsalSVLPDXnWj820
kiSps6yoSJLUc0MeljNRkSSp5+xRkSRJnTXkHhUTFUmSem7liYrNtJlkqbOsQeIS1HNIj4okSeoqh34kSVJnzU+5LUeSjUk+
m+RpmvenJLkmyZ4k705yZLP/qOb9nub4ydN8byYqkiRpOV4N3Lzg/YXAG6vqe4C7gfOa/ecBdzf739ict2ImKplk9VxN
uY2TZDvwe8DFzfzAPwJc2ZxyKfCC5vXO5j3N8bMyxUPpTFQkSeq5+Uy3JZLSnvBNnflX4P+BW+NVL0eOceqjrQvN8L
bGtebwNuBWio39ucvy1200qS1HPTntNW1S5g1+GOJXkecGdVXZvkWVPeamJLipJngbcFXF3JTkGOB84DbgJ+J2qun
cNYpQkSUuY8ayfZwDPT/Jc4GjgMcBfWNYkm5qqyXZgX3P+PmAHsDfJJuB44B9XevNxQz9vBR5oXl/U3OzCZt/bVnpT
SZLUD1X1a1W1vapOBl4MfKyqfgb4OPDC5rZgA80r69q3tMc/1hVrfi5ieOGfjYsGH86vapOa17/VZLrF7uoGduaA9i4a
SsbNx670vgkSdiYLT09+VeBK5L8FvBZ4Jm/yXAHyXZA9zFKLIZsXGJyg1Jzq2qtWgfS3J6Ve1O8r3Aw4tdtHcs66jdwz56
dOSJLVurZ6eXFWfAD7RvL4FOOMw5zwE/NRq3XPC0M9/Bf59ki8CpwL/L8ktwFuaY5lkqWVrseBbW5asqDTNsJ+b5D

HAKc35e6vqjrUITPlkJTfkoYtITU+uqvuaZ804FkmSpEdxHRVJknpuFsA1FRMVSZJ6rut9JtMwUZEKqeeGW0/xWT+SJKn
DrKhIktRzDv1lkqTOWqsF39pgoiJJUs8560eSJHXWcNMUM2kISVKHWVGRJKnnbKadwsH5fn18mzZsbDuEifUx5ocO7
G87hME7MH+w7RAmdtwvXt52CBP5xlte2nYIEzt+7p1thzCRAI85anPbYXSePSqSJLXAJGV5hpummKhIktR7/Rq7mlzN
tJlkqbOsQeIS1HP2qEiSPm4abppioiJJUu/ZoyJktQCKyqSJPVcDXjwx0RFkqSeG/LQj4mKJEK956wfSZLUWcNNU2ymISR
JHWZFRZKknnPoR5lkdZbNtJlkqbOGPD15yR6VJK9KsmOtgPEkSZObn3LrsnHNTL8JXJPkL5P8tyTfsZwvmmQuye4ku+f
nvzl9IJlkaV0al6jcAmxnlLA8FbgpyYeSnJPkuMUuqqpdVXV6VZ2+YcOWVQxXkiQdqqb8r8vGJSpVVfNV9eGqOg84CfGD
4GxGSYwkSWrZkld+xjXTZuGbqnoYuAq4KsnmmUUISZKWbb66XRWZxriKyn9e7EBVPbDKsUiSJD3KkhWVqvr7tQpEki
StzHDrKa6JklS77kyrSRJ6qyuz9yZhomKJEK91/WZO9Pw6cmSJKmzrKhIktRz9qhIkqTOskdFkiR11pB7VExUJEnquVrHK
9NKKiS1xoqKJEK9ZzPtFDYk40/qkPnq30jf/oP9i/moTUEoHcJE9h94uO0QJnbExv79HHLg4IG2Q5jl1pdf1nYIE7vnt89u
O4SJPO5/frjtEHqhF/8KLF///iaTJEmPMuRZP/aoSJkzrKiIkISzw25R8WKiiRJPvdVU23jJNmR5ONJbkpyY5JXN/sfl+QjSb
7Q/PrYZn+SvCnJniR/k+S0IX5vJiqSJPXc/JTbMhwa/kdVnQo8HXhFkIOB84GPVtUTgY827wGeAzyx2eaAN6/0ezNRkSS
p52rK/8Z+/arbquq65vU3gJuBbcBO4NLmtEuBFzSvdwLvqJFPAVuTnLiS781ERZKkdS7JXJLdC7a5Jc49GXgKcA1wQIXd1
hy6HTiheb0NuHXBZxubfROzmVaSpJ6btm2qnYBu8adl+RY4L3Aa6rqvixYK62qKsmqd/WaqEiS1HNr8ayfJEcwSlluq6
r3NbvVSHJiVd3WDO3c2ezfB+xYcPn2Zt/EHPqRJknn5qmpntEyKp1cAtxcVW9YcOgq4Jzm9TnABxbsf1kz++fpwL0Lho
gmYkVfKiSN8wzgpCdfJrm+2fda4HXAe5KcB3wZeFFz7GrgucAe4AHg3JXe2ERFkqSem/US+IX1V8BiD+876zDnF/CK1bi
3iYokST03vwY9Km0xUZEKqeeGm6aYqEiS1HtDftbPkolKkiOBFWnFrao/T/LTwA8xWpFuV1U9vAYxSpKkdWpcReVtzT
mbk5wDHAu8j1HjzBl8a0rSozQr2s0BbNy4lQ0bt6xawJlk6dHWbUUF+MGq+tdJNjFaqOWkqjqY5J3A5xa7aOEKd0cet
X24n54kSR2wFgu+tWVcorKhGf7ZAmwGjgfuAo4CjphxbJlkaRnWcOXIEuDzwEbg14E/TnILOc8XzHj2CRJ0JLMeh2VNi
2ZqFTVG5O8u3n91StvAH4UeEtVfXotApQkSevX2OnJVfXVBa/vAa6caUSSJGki67IHRZlkddx67IGRJEkdN+SKyOa2A5A
kSVqMFRVJknR0oR9JktRZ63Z6siRJ6r75AfeomKhIktRzQ66o2EwrSZI6y4qKJEK959CPJEnqrCEP/cw8UUky61usqj4umt
PHmA/MH2w7hlkcc8RRbYcwsQce/qe2Qxi8Denf6PnWX/9Q2yFM5N4/eHHbIfSCFRVJktRZQ66o9O/HAUmStG5YUZ
Ekqecc+pEkSZ015KEfExVJknquar7tEGbGHhVJktRZVIQkSeo5n54sSZI6q4/raS2XiYokST1nRUWSJHXWkCsqNtNKKqTO
sqliSVLPueCbJEnqLBd8kyRjNtXkHpWxiUqS7wZ+EtgBHAT+HnhXVd0349gkSdlyDHnWz5LNTEleBfwf4Gjg3wJHMUpY
PpXkWUctN5dkd5LdBw/ev4rhSpKk9WRcReXngSdX1cEkbwCurqpnJfID4APAUw53UVXtAnYBHXX0juGmeZlkdcC6H
vppzjnlqJpyLEBVfSXJEBMMTJlKlC96nvVzMFcZJNcAzWQuBEjyHcBdM45NkiQtw7qtqFTVRUn+HPgB4Her6vPN/q8BZ
65BfJlkaR0bO/RTVTcCN65BLJlkaQWGPOvHdVQkSeq5dTv0IomSum89N9NKKqSOG/IS+j49WZIkDZYVFUmSes6hH0
mS1Fk200qSpM6yR0WSJHVVWU21jZPk7CR/l2RPkvPX4Fv6ZyYqkiRpUUK2Ar8PPAc4FXhJklPX6v4O/UiS1HmZ7IE5A
9hTVbcAJLkC2AncNMubPsKKiiRJPvdTbmNsA25d8H5vs29NzLyI8k8P3ZpZfe0kc1W1a1Zff7X1LV7oX8x9ixeMeS30LV
4w5rXQt3iXcmD/vqn+rU0yB8wt2LWrK59N3ysqc+NP6ZS+xQv9i7lv8YlXr4W+xQvGvBb6Fu/MVNWuqjp9wbYwSdKH
7Fjwfnuzb030PVGRJEmz9RngiUIOSXIk8GLgqrW6uc20kiRpUVV1IMkvAX8GbAtEWIU3rtX9+56odGL8bAJ9ixf6F3Pf4
gVjXgt9ixeMeS30Ld7WVNxVwNVt3DtDXnZXkiT1mz0qkiSps3qZqLS5IO9KJHlrkjuT3NB2LMuRZEeSjye5KcmNSV7dd
kzjJDK6yaeTfK6J+Tfajmk5kmxM8tkkf9J2LMuR5EtI/jbJ9UI2tx3PciTZmuTKJ9PcnOSf9d2TEtJ8n3N5/vldl+S17Qd11K
S/HLz5+6GJjcnObrtmMZJ8uom3hu7/vmud70b+mmW8v174McYLTrZGeAlVbUmK+StRJIzgfubd1TVk9qOZ5wkJwln
VtV1S4DrgVe0PHPOMCWqro/yRHAXGvrrpPTrzakpl8d+B04DFV9by24xknyZeA06vq623HslxJLgX+sqoubmYsbK6
qe9qOazmav+/2AU+rqi+3Hc/hJNnG6M/bqVX1YJL3AFdX1dvbjWxxSZ4EXMFoxdX9wleAX6iqPa0GpsPqY0Xln5fyrar
9jH6z7Ww5piVV1V8Ad7Udx3JV1W1VdV3z+hvAzazhKoQrUSP3N2+PaLZOZ+FJtgM/AVzcdixDleR44EzgEoCq2t+XJK
VxFvDFriYpC2wCjkmYCdgmfLXleMb5AeCaqnqgqg4AnwR+suWYtlg+JiqTLuW73iQ5GXgKcE27kYzXDKNcD9wJfKSqu
h7z7wG/Asy3HcgECvhwkmublSy77hTga8DbmiG2i5NsaTuoCbwYuLztIJZSVfuA1wNfAW4D7q2qD7cb1Vg3AM9M8v
gkm4Hn8ugFzdQhfUxUtEaSHAu8F3hNVd3XdjzjVNXBqnoyo1UTz2jKu52U5HnAnVV1bduxTOiHq+o0Rk9RfUUzrNII
m4DTgDdX1VOAbwKd72sDalapng/8cduxLCXJYxlvT8BTgK2JPkv7Ua1tKq6GbgQ+DCjYZ/rgYOTbQVF9TFRaXUp3/Wi
6fN4L3BZVb2v7Xgm0ZT2Pw6c3XYsS3gG8Pym5+MK4EeSvLPdkMZrnfqmq4E3s9oKLB9gJ7F1TXrmSUuPTBc4Drqu
qOtgMZ40eBf6iq1XVw8D7gB9qOaaxquqSqnpqVZ0J3M2o91Ed1MdEpdWlFNeDpjH1EuDmqnpD2/EsR5LvSLK1eX0
Mo2brz7cb1eKq6teqantVnczo9/DHqqrTP4Um2dl0V9MMnzybUQm9s6rqudwJN/X7DqLNXo0/Sp4CR0f9ml8BXh
6ks3N3x1nMepr67Qk/6L59bsY9ae8q92ltJjerUzb9IK+K5HkcuBZWbOS7AUuqKpL2o1qSc8AXgr8bdPzAfDaZmXCrjoR
uLSZJbEBeE9V9WLKb4+cAlx/9G8Rm4B3VdWH2g1pWV4JXNb8YHMLcG7L8YzVJII/Bry87VjGqaprklwJXAccAD5LP1Z
8fW+SxwMPA6/oWZP1utK76cmSJGn96OPQjyRJWidMVCRJUmeZqEiSpM4yUZEKsZ1loiJJKjRLREWSJHWWiYokSeosE
xVJktRZ/x8JEFEJ5PDKzgAAAABJRU5ErkJggg==\"n\"

},

"metadata": {

"needs_background": "light"

```
    }
  }
]
},
{
  "cell_type": "markdown",
  "source": [
    "\n",
    "***(iii).Make Prediction***"
  ],
  "metadata": {
    "id": "c3tGHu2b7Z5z"
  }
},
{
  "cell_type": "code",
  "source": [
    "my_num = x_test[1]"
  ],
  "metadata": {
    "id": "dGA30k8U7Vgs"
  },
  "execution_count": 38,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "classes_x"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    }
  },
}
```

```
"id": "zFQfsWGW7kg8",
"outputId": "cdd1dfb2-289f-4c03-fc32-79cc35aa1db0"
},
"execution_count": 39,
"outputs": [
  {
    "output_type": "execute_result",
    "data": {
      "text/plain": [
        "array([7, 2, 1, ..., 4, 8, 6])"
      ]
    },
    "metadata": {},
    "execution_count": 39
  }
],
},
{
  "cell_type": "code",
  "source": [
    "\n",
    "plt.imshow(my_num.reshape(28,28))"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/",
      "height": 282
    },
    "id": "R6ju5Udq7sye",
    "outputId": "6cd6ab6e-1363-4ba8-c68b-e8ec5b8b60fd"
  },
  "execution_count": 40,
  "outputs": [
    {
```

```
"output_type": "execute_result",
"data": {
  "text/plain": [
    "<matplotlib.image.AxesImage at 0x7f8847736550>"
  ]
},
"metadata": {},
"execution_count": 40
},
{
  "output_type": "display_data",
  "data": {
    "text/plain": [
      "<Figure size 432x288 with 1 Axes>"
    ],
    "image/png":
      "iVBORw0KGgoAAAANSUhEUgAAAPsAAAD4CAYAAAAAq5pAIAAAABHNCSVQICAgIfAhkiAAAAAlwSFlzAAALEgAACxI
      B0t1+/AAAADh0RVh0U29mdHdhcmUAbWF0cGxwdGxpYiB2ZXJzaW9uMy4yLjlsIGh0dHA6Ly9tYXRwbG90bGliLm9y
      Zy+WH4yJAAANzUIEQVR4nO3df6zV9X3H8dcL5IdFVBIMMSRaLMRiF6G9oXV1m8a1s/xRbLK5ks5hY3O7rG5tQtlat6
      Q2/RGzVN2WNV1oJaWLP+L8UVlqOpHaOFuCXhwFhLZQhyvsChJuB24ZcK/v/XG/NFe93++5nPM9P+T9fCQ355zv+3y
      /33eOvvie8/2c7/k4IgTg7Dep2w0A6AzCDiRB2IEkCDuQBGEHkjinkzub6mkxXTM6uUsglf/T/+hknPB4tZbCbvs6SX8na
      bKkb0bEHVXPn64Zeq+vbWWXACpsjc2ltabfxtueLOlrkj4kaamk1baXNrs9AO3Vymf2FZL2RcSLEXFS0gOSVtXTFoC6tR
      L2BZJ+MebxgWLZ69jutz1ge+CUTrSwOwCtaPvZ+IhYfXf9EdE3RdPavTsAJVoJ+0FJC8c8vqhYBqAhtRL25yQttv1221MI
      fVTSxnraALC3pofelmlY9i2S/IWjQ2/rl+KF2joDUKuWxtkj4nFJj9fUC4A24uuyQBKEHUiCsANJEHYgCclOJEHYgSQIO5AE
      YQeSIOxAEOQdSIKwA0kQdiAJwg4k0dGfkkZz9n/pysr6yPTyyTnnXv5K5bpbrni4qZ5Ou/T7H6+sz3z23NLavL//UUV7xp
      nhY44kQdiBJAg7kARhB5Ig7EASHB1IgrADSTDO3gOGvru4sr5r2T+0bd+nyofoJ+Qn13yzsn5v3/zS2oObfq9y3ZE9e5vq
      CePjyA4kQdiBJAg7kARhB5Ig7EASHB1IgrADSTDO3gGNxtF/uOyBtu37H3+5qLJ+15YPVNYvubj6evgnlj5SWf/YzMH52
      pdvmlO57qLPMc5ep5bCbnu/pOOSRIQNR0RFHU0BqF8dR/ZrIuIDdsB0EZ8ZgeSaDXslekJ29ts94/3BNv9tgdsD5zSiRZ
      3B6BZrb6NvyoiDtr+dUmbbP8klp4e+4SIWCdpnSSd79ktXnYBoFktHdkj4mBxe1jSo5JW1NEUgPo1HXbbM2zPPH1f0g
      cl7aqrMQD1auVt/DxJj9o+vZ37luJ7tXT1FjN87Xsq69+/4msNtjClsvq3Q0sq60/9ccWI538drlx3ydBAZX3S9OmV9a9s/a
      3K+m1zdpbWhmcNV66LejUd9oh4UdIVNfYCoI0YegOSIOxAEOQdSIKwA0kQdiAJLNgTwasLplbWJzX4N7XR0NoPPIw9
      vDxy4k8r663Y94XIlfx7Zt/ZYAvTSisXf9jTsfXagNJEHYgCclOJEHYgSQIO5AEYQeSIOxAEOyZ1+DCb2+prP/hwJ9U1j10rL
      l+PLj/DDuqzydWPIIZP29S+Tg6egtHdiAJwg4kQdiBJAg7kARhB5Ig7EASHB1IghH2DhjZ/bNut1Bq/5evrKzffOFGX2yh+q
      em1w6+r7Q288k9leuONNGzzgxHdiAJwg4kQdiBJAg7kARhB5Ig7EASHB1IghH2s9wvb6weR//hn1aPo18wqXocfcuJyZ
      X17V8q/935c489W7ku6tXwyG57ve3DtneNWTbb9ibbe4vbWe1tE0CrJvI2/luSrnnDslsly6lxZl2F48B9LCGYy+IpyUdf
      cPiVZl2FPc3SLq+5r4A1KzZz+zzlmKwuP+ypHlIT7TdL6lflqbrbU3uDkCrWj4bHxehKSrq6yKiLyL6plRM8gegvZoN+yHb8
      yWpuD1cX0sA2qHZsG+UtKa4v0bSY/W0A6BdGn5mt32/pKslzbF9QNLnd0h6UHbN0t6SdIN7WwSzTvy7tJPWJlaj6M
      3suYHn6isL/kOY+m9omHYI2J1SenamnsB0EZ8XRZlgrADSRB2IAnCDiRB2IEkuMT1LHBy08WltS2X3dlg7eqhtyu2rKms
      v3Ptzyvr/Bx07+DIDiRB2IEkCDuQBGEHkiDsQBKEHUiCsANJMM7+FndOooksq6198xz+X1mY1uIR124nqfV/8xeqR8pG
      hoeoNoGdwZAeSIOxAEOQdSIKwA0kQdiAJwg4kQdiBJBhnfwu49MGDIxIU5v/N3v15j+rrc/58XNNbxu9hSM7kARhB
      5Ig7EASHB1IgrADSRB2IAnCDiTBOHsPGFpzZWXC/Ma/fb7tNLKmv2/X7nmOz+7r7LO776fPRoe2W2vt33Y9q4xy263
      fdD29uJvZxvbBNCqibYn/5ak68ZZfndELCv+Hq+3LQB1axj2iHha0tEO9AKgjVo5QXel7R3F2/xZZU+y3W97wPbAKTX4
      wTMAbdNs2L8u6VJjyQNSio9gxQR6yKiLyL6plScaLQXk2FPSIORcRIRLwm6RuSVtTbFoC6NRV22/PHPPYlpF1lwXQ
      GxqOs9u+X9LVkubYPiDp85Kutr1MUKiaL+mTbezLe+cBb9ZWf+dv9xaWT9vUvMff7bsfkdlfckQ16tn0TDsEbF6nMX3
```

tKEXAG3E12WBJAg7kARhB5Ig7EAShB1lgtcO2DPbQsr69/5jX9pafvX7Pyj0hqXsOI0juxAEoQdSIKwA0kQdiAJwg4kQdiBJAg7kATj7B2w7cN3N3hGa7/gc8Gfv1ZaGx4aamnbOhtwZAeSIOxAEOQdSIKwA0kQdiAJwg4kQdiBJBhnPwucmndBaW3KyQUd7OTNRI45UIqLE9XTgXla9fcPJs+d01RPkjQy98LK+t61U5ve9kTEiEtr/1Fg98gOHasqX1yZAeSIOxAEOQdSIKwA0kQdiAJwg4kQdiBJBhnPwt896H13W6h1G//+3iTAI86cuj8ynVnzT1eWd/6nvua6qnXlf3rWyriz67pantNjyy215o+ynbu22/YPvTxfLZtjfZ3lvczmqqAwAdMZG38cOS1kbEUknvk/Qp20sl3Sppc0QslrS5eAygRzUMe0QMRsTzxf3jkvZIWiBplaQNxdM2SLq+XU0CaN0ZfWa3fYmk5ZK2SpoXEYNF6WVJ80rW6ZfUL0nT9bZm+wTQogmfjbd9nqSHJX0mIl73TfYlCEkx3noRsS4i+iKib0qLP6wloHkTCrvtkRoN+r0R8Uix+JDt+UV9vqTD7WkRQB0avo23bUn3SNoTEXeNkW2UtebSHcXtY23p8CywavfHKuub3/VQhzrpvB8tv79r+/7fOfIaOxXlP789Est33FRZ+/tzV9+u+CZ4abXrTKRz+zvI3SjpJ22txfLbtNoyB+0fbOklyTd0JOAdSiYdgj4hIJZVfaX1tvOwDaha/LAkkQdiAJwg4kQdiBJAg7kASXuHbAuX/wH5X1y79SfUljtPG/0szLjlbW23kZ6eX/9vHKEvnjJa2v+ihV8uLz+5saduztLelejdWZAeSIOxAEOQdSIKwA0kQdiAJwg4kQdiBJDz6IzOdcB5nx3vNhXJAU2yNzToWR8e9SpUjO5AEYQeSIOxAEOQdSIKwA0kQdiAJwg4kQdiBJAg7kARhB5Ig7EAShB1lgrADSRB2IAnCDiTRMOy2F9p+YvZu2y/Y/nSx/HbbB21vL/5Wtr9dAM2ayPQDw5LWRsTztmdK2mZ7U1G7OyK+2r72ANRilvOzD0oaLO4ft71H0oJ2NwagXmf0md32JZKWS9paLLrF9g7b623PKlMn3/aA7YFTOTfSswCaN+Gw2z5P0sOSPhMRxyR9XdKlkpZp9Mh/53jrRcS6iOiLiL4pmlZDywCaMaGw256i0aDfGxGPSFJEHIqIkYh4TdI3JK1oX5sAWjWRs/GWdl+kPRFx15jI88c87SOSdtXfHoC6TORs/Psl3Shpp+3txbLbJK22vUxSSNov6ZNt6RBALSzyNv4ZSeP9DvXj9bcDoF34Bh2QBGEHkiDsQBKEHUiCsANJEHYgCcIOJEHYgSQIO5AEYQeSIOxAEOQdSIKwA0kQdiAJR0Tndma/lumIMYvmSDrSsQbOTK/21qt9SfTWrdp7uzgi5o5X6GjY37RzeyAi+rrWQlVe7a1X+5LorVmd6o238UAShB1lotthX9fl/Vfp1d56tS+J3prVkd66+pkdQOd0+8gOoEMI05BEV8Ju+zrbP7W9z/at3eihjO39tnCW01APdLmX9bYP2941ZtIs25ts7y1ux51jr0u99cQ03hXTjHf1tev29Ocd/8xue7Kkn0n6gKQDkp6TtDoidne0kRK290vqi4iufwHD9u9KelXStyPiXcWYv5F0NCLuKP6hnBURn+uR3m6X9Gq3p/EuZiuaP3aacUnXS7pJXXztKvq6QR143bpxZF8haV9EvBgRJyU9IGlVF/roeRHxtKSjb1i8StKG4v4Gjf7P0nElvfWEiBiMiOeL+8clnZ5mvKuvXUVfHdGNsC+Q9Isxjw+ot+Z7D0IP2N5mu7/bzYxjXkQMFvdfIjSvm82Mo+E03p30hmnGe+a1a2b681Zxgu7NroqlD0v6kKRPFw9Xe1KMfgrbpbHTCU3j3SnjTDP+K9187Zqd/rxV3Qj7QUkLxzy+qFjWEyLiYHF7WNKj6r2pqA+dnkG3uD3c5X5+pZem8R5vmnH1wGvXzenPuxH25yQttv1221MlfVTSxi708Sa2ZxQnTmR7hqQPqvemot4oaU1xf42kx7rYy+v0yjTeZdOMq8uvXdenP4+lJv9JWqnRM/I/I/RX3eihpK9Fkn5c/L3Q7d4k3a/Rt3WnNHpu42ZJvyZps6S9kp6UNLuHevsNSTsl7dBosOZ3qberNPoWfYek7cXfym6/dhV9deR14+uyQBKcoAOSIOxAEOQdSIKwA0kQdiAJwg4kQdiBJP4fcKgKSEIBgPIAAAAASUVORK5CYII=\n"

```
},
"metadata": {
  "needs_background": "light"
}
}
]
},
{
  "cell_type": "markdown",
  "source": [
    "***(iv).Save the Model***"
  ],
  "metadata": {
    "id": "3qtvALHM72nv"
  }
},
{
```

```

"cell_type": "code",
"source": [
    "from tensorflow.keras.models import load_model\n",
    "\n",
    "model.save('CNN.h5')\n",
    "print('Model Saved!')\n",
    "\n",
    "savedModel=load_model('CNN.h5')\n",
    "savedModel.summary()"
],
"metadata": {
    "colab": {
        "base_uri": "https://localhost:8080/"
    },
    "id": "OPPoHpx-76a3",
    "outputId": "71106e43-1daf-4e65-ff35-ee868daa827c"
},
"execution_count": 41,
"outputs": [
    {
        "output_type": "stream",
        "name": "stdout",
        "text": [
            "Model Saved!\n",
            "Model: \"sequential\"\n",
            "_____ \n",
            " Layer (type)          Output Shape          Param #   \n",
            "===== \n",
            " conv2d (Conv2D)        (None, 25, 25, 32)     544       \n",
            "                        \n",
            " max_pooling2d (MaxPooling2D) (None, 12, 12, 32)     0         \n",
            " )                        \n",
            "                        \n",
            " flatten (Flatten)      (None, 4608)           0         \n",

```

```
"
                                \n",
"dense (Dense)      (None, 128)      589952  \n",
"
                                \n",
"dense_1 (Dense)    (None, 10)      1290   \n",
"
                                \n",
"===== \n",
"Total params: 591,786\n",
"Trainable params: 591,786\n",
"Non-trainable params: 0\n",
"_____ \n"
]
}
]
}
]
}
```