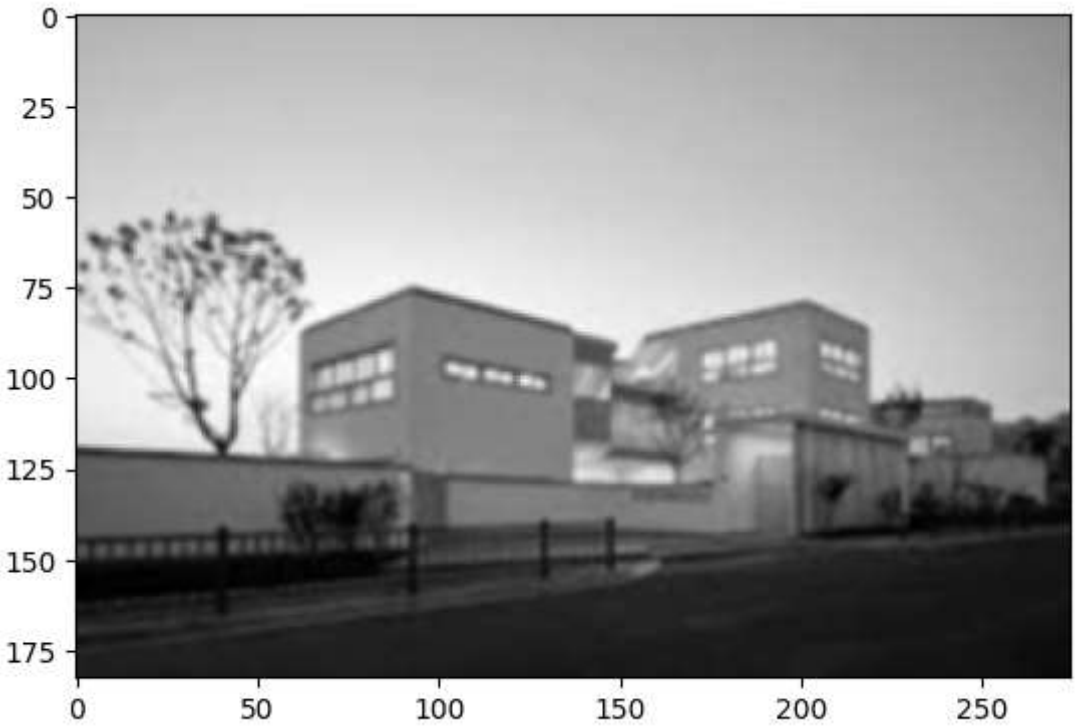
In [ ]:
```
import cv2
import numpy as np
import matplotlib.pyplot as plt
```

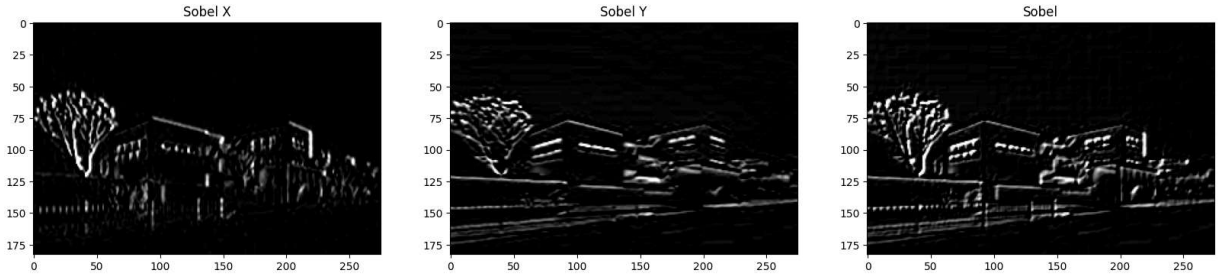
In [ ]:
```
img = cv2.imread('images.jpg',0)
plt.imshow(img, cmap='gray')
plt.show()
```

In [ ]:
```
img_gaussian = cv2.GaussianBlur(img,(3,3),0)
plt.imshow(img_gaussian, cmap='gray')
plt.show()
```

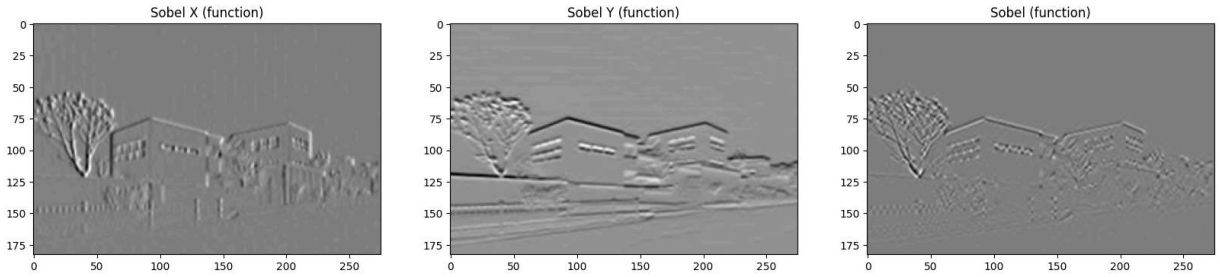


Sobel Operator

In [ ]:
```
Sobel_x = np.array([[-1, 0, 1],
                    [-2, 0, 2],
                    [-1, 0, 1]])
Sobel_y = np.array([[-1, -2, -1],
                    [0, 0, 0],
                    [1, 2, 1]])
sobel = Sobel_x + Sobel_y

img_sobelx = cv2.filter2D(img_gaussian, -1, Sobel_x)
img_sobely = cv2.filter2D(img_gaussian, -1, Sobel_y)
img_sobel = cv2.filter2D(img_gaussian, -1, sobel)

fig, ax = plt.subplots(1, 3, figsize=(20, 20))

ax[0].imshow(img_sobelx, cmap='gray')
ax[0].set_title('Sobel X')

ax[1].imshow(img_sobely, cmap='gray')
ax[1].set_title('Sobel Y')

ax[2].imshow(img_sobel, cmap='gray')
ax[2].set_title('Sobel')

plt.show()
```



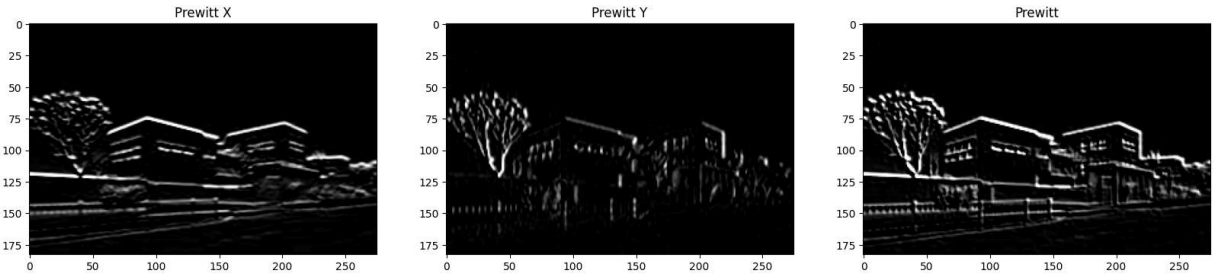
In [ ]:
```
sobel_x_function = cv2.Sobel(img_gaussian, cv2.CV_64F, 1,0, ksize=3)
sobel_y_function = cv2.Sobel(img_gaussian, cv2.CV_64F, 0,1, ksize=3)
sobel_xy_function = cv2.Sobel(img_gaussian, cv2.CV_64F, 1,1, ksize=3)

fig, ax = plt.subplots(1, 3, figsize=(20, 20))

ax[0].imshow(sobel_x_function, cmap='gray')
ax[0].set_title('Sobel X (function)')

ax[1].imshow(sobel_y_function, cmap='gray')
ax[1].set_title('Sobel Y (function)')

ax[2].imshow(sobel_xy_function, cmap='gray')
ax[2].set_title('Sobel (function)')

plt.show()
```



Prewitt Operator

In [ ]:
```
kernelx = np.array([[1,1,1],[0,0,0],[-1,-1,-1]])
kernely = np.array([[-1,0,1],[-1,0,1],[-1,0,1]])
kernel = kernelx + kernely

img_prewittx = cv2.filter2D(img_gaussian, -1, kernelx)
img_prewitty = cv2.filter2D(img_gaussian, -1, kernely)
img_prewitt = cv2.filter2D(img_gaussian, -1, kernel)

fig, ax = plt.subplots(1, 3, figsize=(20, 20))

ax[0].imshow(img_prewittx, cmap='gray')
ax[0].set_title('Prewitt X')

ax[1].imshow(img_prewitty, cmap='gray')
ax[1].set_title('Prewitt Y')

ax[2].imshow(img_prewitt, cmap='gray')
```

```
ax[2].set_title('Prewitt')

plt.show()
```



Display All:

In [ ]:
```
fig, ax = plt.subplots(4, 3, figsize=(20, 20))

# Cell 1
ax[0, 0].imshow(img, cmap='gray')
ax[0, 0].set_title('Original Image')

# Cell 2
ax[0, 1].imshow(img_gaussian, cmap='gray')
ax[0, 1].set_title('Gaussian Blur')

# Cell 3
plt.delaxes(ax[0, 2])

# Cell 4
ax[1, 0].imshow(img_sobelx, cmap='gray')
ax[1, 0].set_title('Sobel X')

# Cell 5
ax[1, 1].imshow(img_sobely, cmap='gray')
ax[1, 1].set_title('Sobel Y')

# Cell 6
ax[1, 2].imshow(img_sobel, cmap='gray')
ax[1, 2].set_title('Sobel')

# Cell 8
ax[2, 0].imshow(sobel_x_function, cmap='gray')
ax[2, 0].set_title('Sobel X (function)')

# Cell 9
ax[2, 1].imshow(sobel_y_function, cmap='gray')
ax[2, 1].set_title('Sobel Y (function)')

# Cell 10
ax[2, 2].imshow(sobel_xy_function, cmap='gray')
ax[2, 2].set_title('Sobel (function)')

# Cell 12
ax[3, 0].imshow(img_prewittx, cmap='gray')
ax[3, 0].set_title('Prewitt X')
```

```
# Cell 13
ax[3, 1].imshow(img_prewitty, cmap='gray')
ax[3, 1].set_title('Prewitt Y')

# Cell 14
ax[3, 2].imshow(img_prewitt, cmap='gray')
ax[3, 2].set_title('Prewitt')

plt.tight_layout()
plt.show()
```