Steps to set up RAID 5 on Ubuntu Server 18.04 using mdadm (3 drives):

1. Install mdadm.
2. Find the disks that will be used by doing sudo fdisk -l | grep sd. The disks will probably look like "/dev/sda1". The "sd" means "SATA disk", the letter that follows is the drive letter (usually a-z (like on windows when you plug in an external device)) and the number that follows is the partition. (SATA disk + drive letter + partition number).
3. Do sudo mdadm --examine /dev/sda /dev/sdb /dev/sdc to examine the three drives for any existing RAID blocks.
4. In order to partition the disks for RAID, follow these steps for each disk:
    a. Do sudo fdisk /dev/{DEVICE} where {DEVICE} is sda, sdb, and sdc.
    b. Make sure that the device is empty by typing p to list the partitions. If it is not empty, type d to delete the partitions.
    c. Choose n to create a new partition.
    d. Choose p for a primary partition.
    e. Choose 1 to be the first partition.
    f. Change the type by typing t and typing the code for "Linux RAID" (which can be found by typing L in the type menu).
    g. Enter w to write the changes you made and exit.
5. Once you have done that for all 3 drives, do sudo reboot so that the changes to the drives are done on boot.
6. Now if you do sudo mdadm --examine /dev/sda /dev/sdb /dev/sdc then it should say something like "Partition[0]: 123456789 sectors at 1234 (type fd)", however the type can also be type "ee" too.
7. Now create a raid device called "md0" in /dev by doing sudo mdadm --create /dev/md0 --level=5 --raid-devices=3 /dev/sda1 /dev/sdb1 /dev/sdc1.
8. After creating the raid device, check it by doing cat /proc/mdstat. Please wait until the recovery meter finishes to do anything involving reading or writing.
9. Verify the RAID devices by doing sudo mdadm -E /dev/sd[a-c]1 to check that all the drives in the array are doing what they should be.
10. Make sure that the devices all show up and are syncing through doing sudo mdadm --detail /dev/md0. This will also show the rebuild status.
11. Create the ext4 filesystem on /dev/md0 by doing sudo mkfs.ext4 /dev/md0.
12. Make the directory /mnt/raid-5-1 where the first number is the RAID type and the second number is the ID of the array. This can be done by doing sudo mkdir /mnt/raid-5-1.
13. Mount the filesystem on /mnt/raid-5-1 by doing sudo mount /dev/md0 /mnt/raid-5-1.
14. Make a file on the array to test that it is working by doing sudo touch /mnt/raid-5-1/hello-array.txt and then check that it exists by doing ls /mnt/raid-5-1.
15. Add an entry in /etc/fstab or else the system will not display the mount point after system reboot. To do this, edit /etc/fstab and write "/dev/md0 /mnt/raid-5-1 ext4 defaults 0 0".
16. Run sudo mount -av to ensure that there are no errors in the fstab entry line you just added.
17. Since RAID doesn't have a config file by default, you have to save it manually. This can be done by creating a file called /etc/mdadm.conf and pasting the output of the command sudo mdadm -D --scan in the file.
18. Update initramfs by doing sudo update-initramfs -u.
19. Now you can reboot the system to check if the changes stayed.

Steps to set up email notifications for mdadm on Ubuntu Server 18.04:

1. Add the email address that you want to get notifications at by adding a line to /etc/mdadm.conf that says "MAILADDR {EMAILADDRESS}" where {EMAILADDRESS} is your email address (EX: "MAILADDR johndoe@domain.su").
2. If the sendmail package isn't already installed, install it by running sudo apt-get install sendmail.
3. If the machine you are running the RAID array on doesn't allow sending email directly from itself (which is very common) then follow these steps to install and configure SSMTP.
   a. Run sudo apt-get install ssmtp to install SSMTP on your machine.
   b. Open the configuration file at /etc/ssmtp/ssmtp.conf and add/edit the following lines as shown: "root=yourEmail@domain.com", "mailhub=smtp.domain.com:smtpPort", "hostname=domain.com", "AuthUser=yourEmail@domain.com", "AuthPass=yourEmailPassword", "UseTLS=YES".
4. Test that this is working by running sudo mdadm --monitor --scan --test -1. This will send out a test email to your address. If the email sends successfully there will be no output to this command in the command line.
5. Restart mdadm by doing sudo /etc/init.d/mdadm restart.

Steps to add a drive to the RAID array to replace a failed one on Ubuntu Server 18.04:

1. Find which disk is missing by typing `cat /proc/mdstat`. There you will see that one of the drives has been replaced by (F) which means it is failed.
2. Copy the partition table to the disk that you are adding to the array by running `sudo fdisk -d /dev/sda | sudo sfdisk /dev/sdb` (replace /dev/sda with a working disk and /dev/sdb with the new disk).
3. Add the new disk back to the array by running `sudo mdadm --manage /dev/md0 --add /dev/sdb1` where /dev/sdb1 is the drive that is being added back.
4. Check the recovery status by running `cat /proc/mdstat`. When the progress reaches 100% or disappears then it is safe to reboot and mess with the system.

Steps to expand the RAID array by adding a drive on Ubuntu Server 18.04:
1. Format the drive properly as is done when creating the array with fdisk.
2. Add the drive by running sudo mdadm --add /dev/md0 /dev/sdd1 where you replace /dev/md0 with your RAID device and replace /dev/sdd1 with the partition you want to add to the array.
3. Grow the array by running sudo mdadm --grow --raid-devices=4 /dev/md0, where 4 is replaced with the new total amount of drives in the RAID array and where /dev/md0 is the RAID device.