



GET GROUNDED

INTRODUCTION TO BUILDING A STATION GROUND

TARC HF UNIVERSITY, FEBRUARY 2023

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DISCLAIMER AND REMINDER...

The practices and recommendations in this book are not guaranteed to prevent damage to equipment or ensure personal safety. It is the responsibility of the station builder to comply with all applicable standards and regulations, use adequately rated and listed materials, and maintain the station and equipment properly. If you are unsure of your ability to do the job correctly, hire a professional to perform or inspect your work. Where electricity is concerned, there is no substitute for careful work, attention to detail, and personal vigilance.

- H Ward Silver, N0AX, Feb 2017

AGENDA



What you will learn



Why this is important



How I started



My Own Journey



Going deeper (resources)



Your Questions

WHY THIS IS IMPORTANT

- Electrical Safety
- Lightning Protection
- RF Management





WHAT STATE HAS THE
HIGHEST NUMBER OF
LIGHTNING STRIKES?



Florida

The image features a dark blue background with white, stylized circuit traces in the corners. These traces consist of lines and small circles, resembling a printed circuit board layout. The traces are located in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

ELECTRICAL SIGNALS MOVE AT WHAT SPEED?

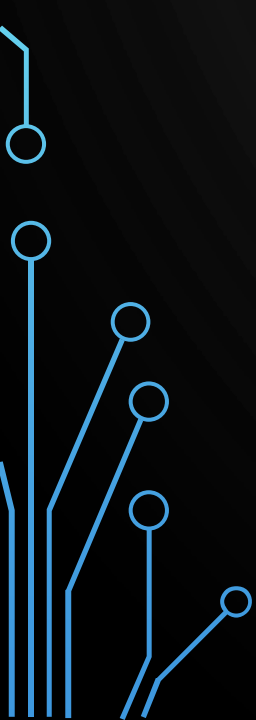

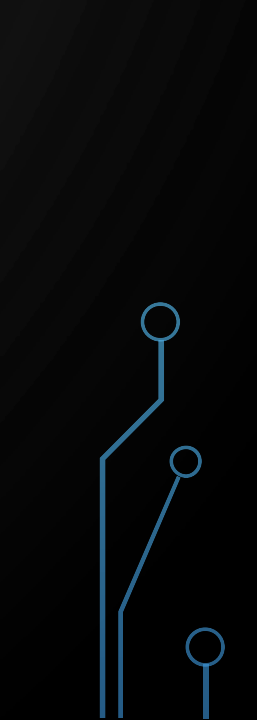
1 foot per nanosecond

MY OWN JOURNEY

- Install lightning protection for 3+ antennas.
- Re-route coax, install 2 new antennas, and active multicoupler.
- Install an outdoor, waterproof, single point ground panel.
- Have a central point ground close to service ground.

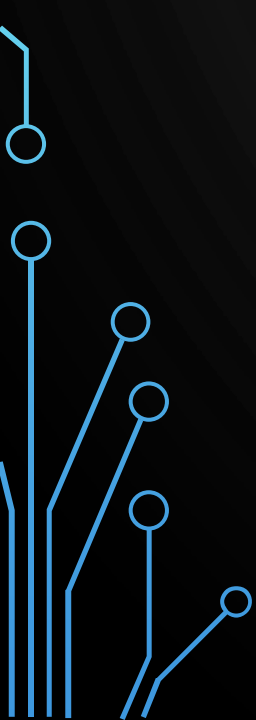


BONDING

- Connecting things together so that the voltage between them is minimized.
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- 
- 



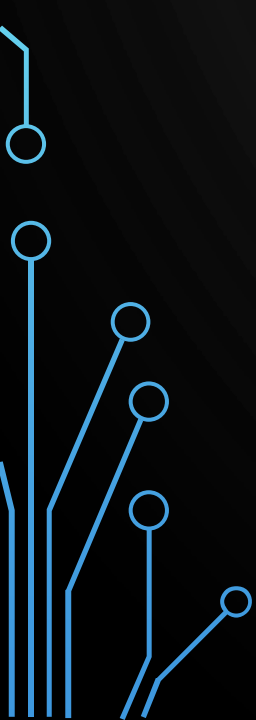
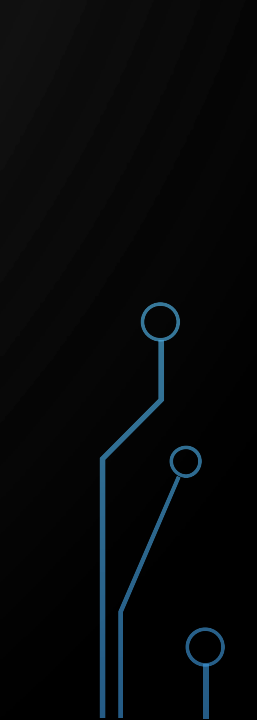
SINGLE POINT GROUND

- A shared common connection point also connected to the earth.
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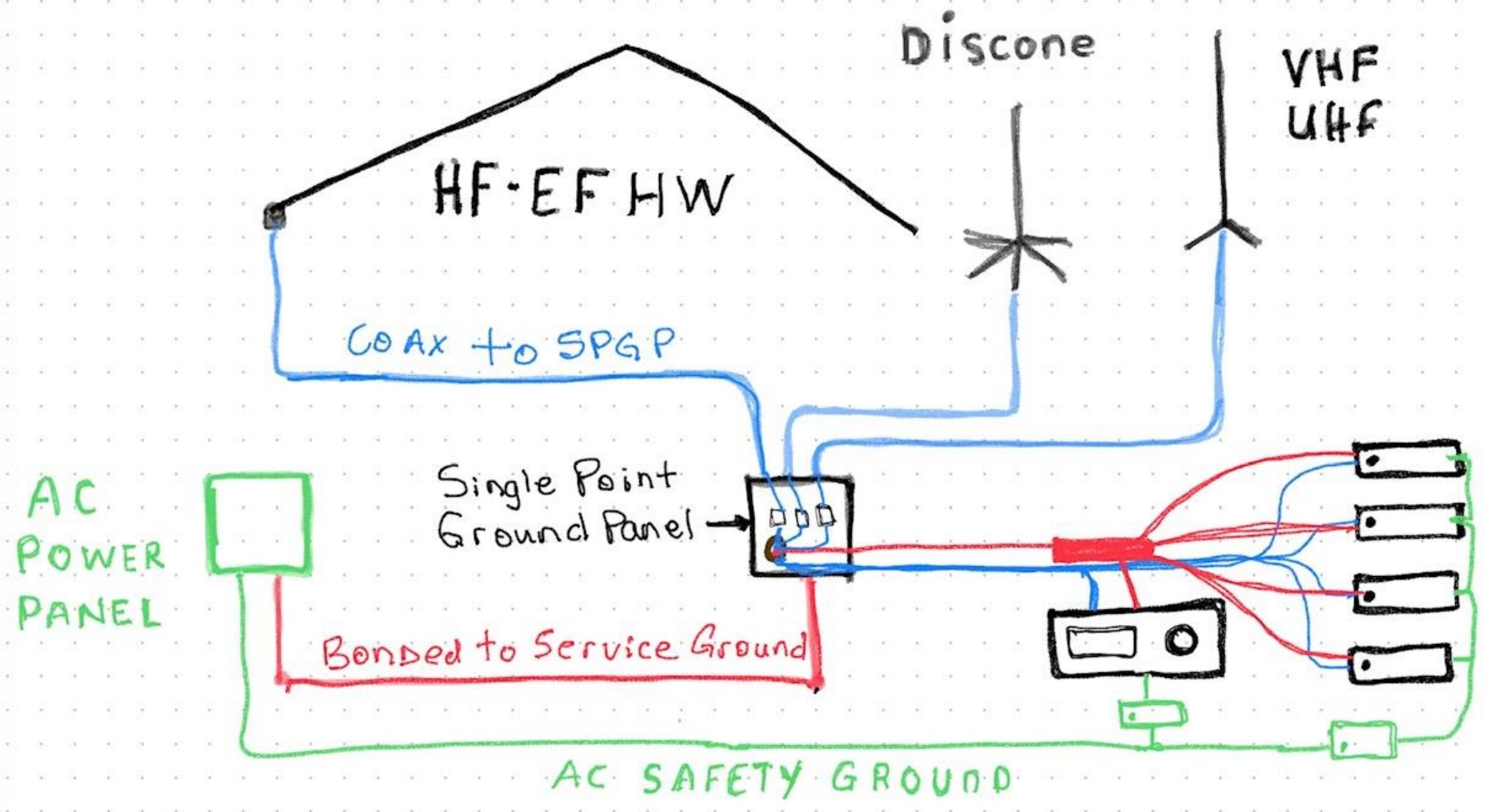


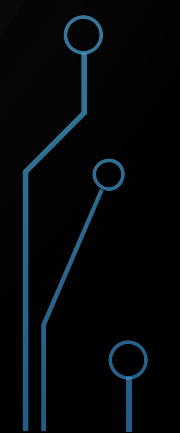
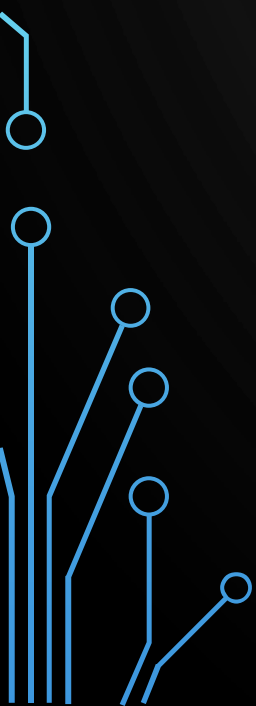
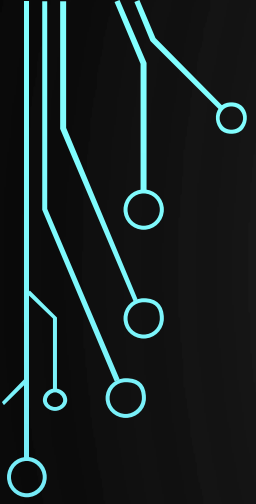
SINGLE POINT GROUND PANEL (SPGP)

- A metallic entry panel for the feed lines of all antennas and other services.
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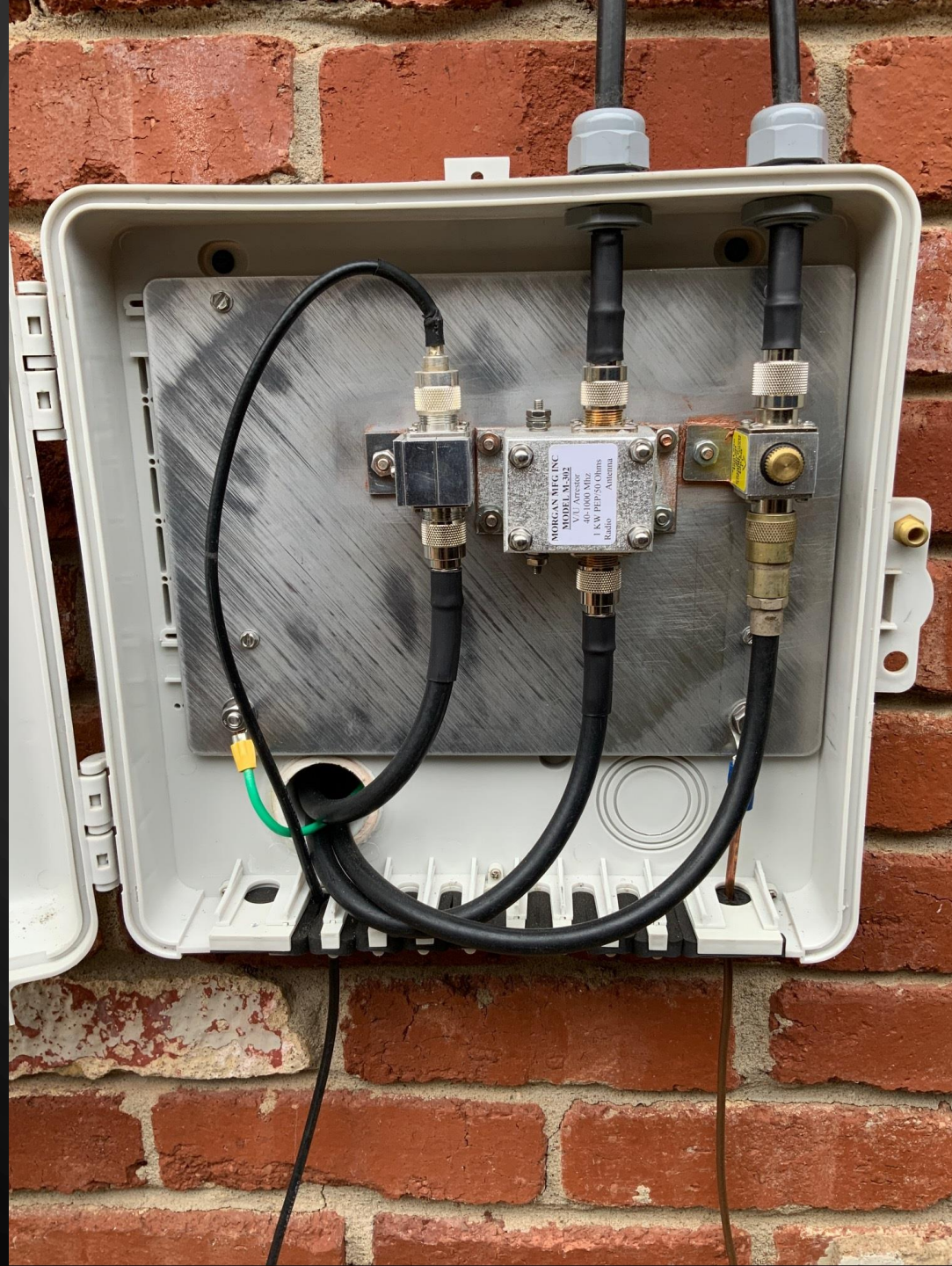
HOW I STARTED

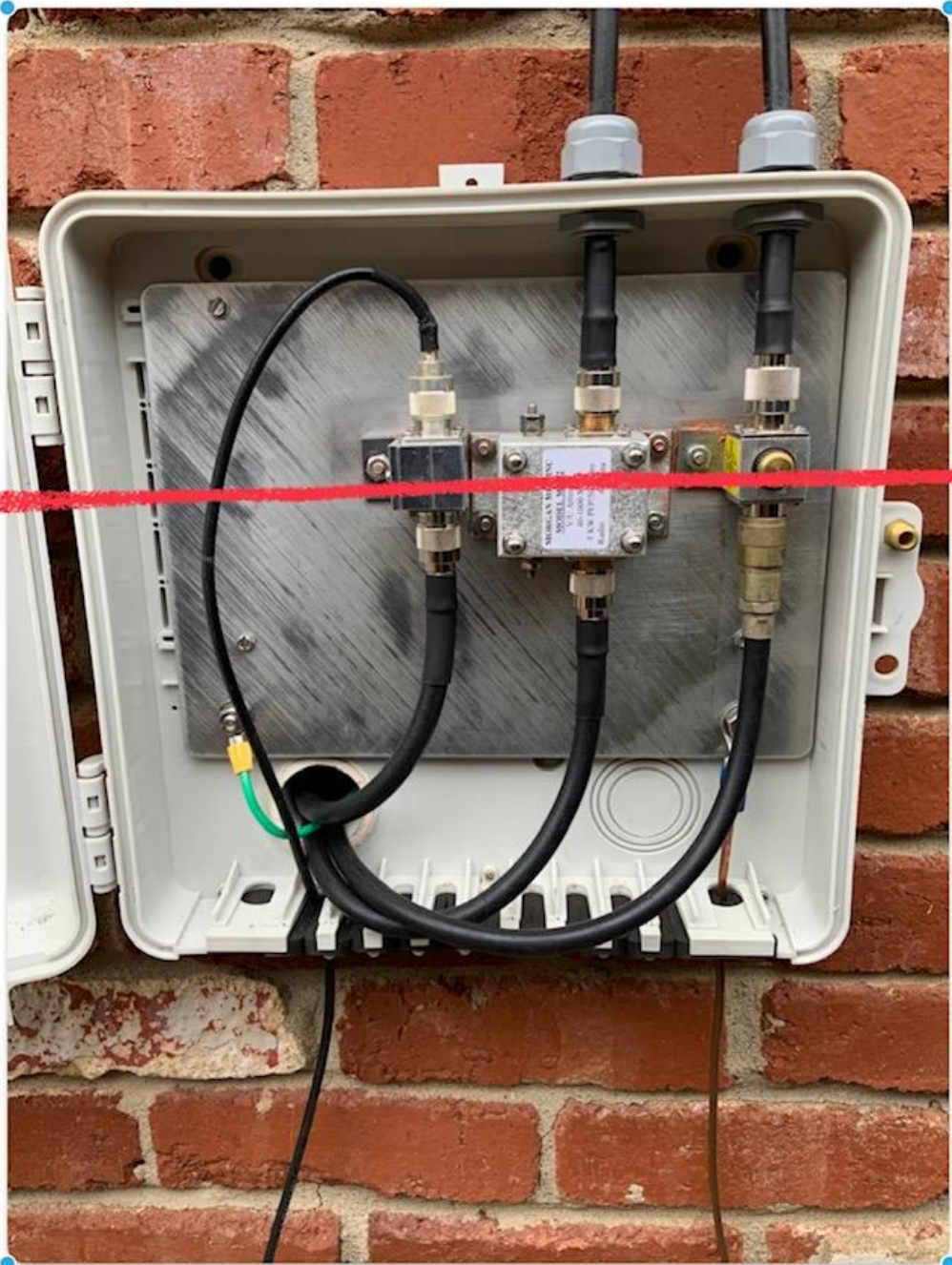
- Created an inventory of antennas and gear that I wanted to include.
- Think about the coax runs and access to the shack from the outside.
- Can I locate the access point close to an 8ft ground rod
- What about proximity to the main electrical service ground?
- What about expansion? Can I add more lightning suppressors?
- Plan out the location of everything in the SPGP before drilling holes.
- Researched drilling a hole in the wall to create the access.
- Safety first.





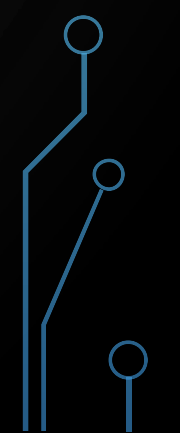
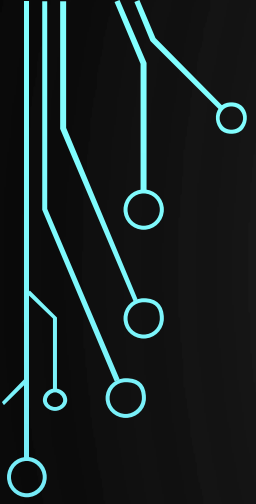
DXE-UE-2P
Utility Enclosure
www.dxe.com
1-800-777-0703





UNPROTECTED

PROTECTED



GOING DEEPER

- Grounding and Bonding for the Radio Amateur. H. Ward Smith, NOAX (ARRL)
- Motorola Standards and Guidelines for Communication Sites (R56 2005)
- Websites: KF7P.com, W8JI.com, K0BG.com, K9YC.com
- DX Engineering Utility Enclosure, Part Number: DXE-UE-2P (\$75)
- [Good video](#) on options for your SPSG at KF7P.
- Remember: lightning arrestors are specific to frequency



ENTRANCE PANELS

Defender Series™ entrance panel boxes

Our entry panel boxes are the perfect solution to getting all communications cabling through a wall and into the radio room in a neat manner, while providing lightning and surge suppression at the same time. Boxes are hand crafted one at a time and customized for your specific needs.

Common, included features of all Defender Series™ entry panel boxes:

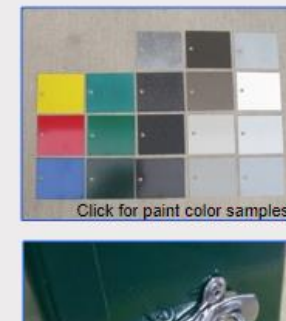
- Made from galvanized steel, aluminum, or stainless in multiple gauges.
- Powdercoated your choice of many colors, seen below.
- Lockable latch, padlocks available below.
- Gasketed lid.
- Copper mounting sheet.
- Slots on bottom for copper strap to enter and ground copper sheet.
- Grommet holes on bottom for cables; extra holes can be plugged for future use.
- Larger cutouts for conduit in bottom also possible.

We also stock and install POLYPHASER, ALPHA DELTA and MORGAN MANUFACTURING surge protectors in our boxes! Arrestors can be pre-installed for a small charge; see "Optional Accessories" below to select this option.



N6GR's entry panel and grounding set-up.

How to order video, must watch before ordering!
7 minutes, 55 seconds.





WEBSITES TOUR

GOING DEEPER

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$y = \sin x$
 $y = 2 \sin 5$
 $A = 2; P = \frac{2\pi}{3}$

$P(A|B) = \frac{P(A \cap B)}{P(B)}$
 $C = 2\pi r$



$u(t) = u_1(t) - u_2(t)$
 $N = C \cdot \cos(a)$

$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$
 $P(A) = \sum p(\omega)$

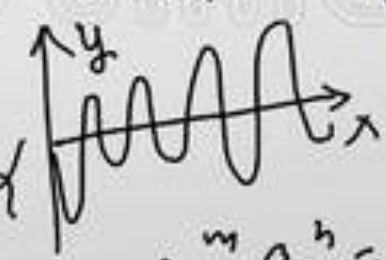
$\sqrt{2} \sin 2x$
 $\lim_{x \rightarrow a} ax$

$a^2 + b^2 = c^2$
 $\lim_{x \rightarrow \infty} f(x) = \dots$
 $y = ax^2 + bx + c$



$A = A$
 $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
 $(a+b)^2 = a^2 + 2ab + b^2$

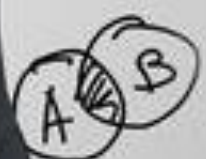
$E = mc^2$



$da = \frac{d \cdot c \cdot \cos a}{a}$
 $T = n \cdot \sqrt{\dots}$

$a^m \cdot a^n = a^{m+n}$

$\lim_{x \rightarrow a} c = c$



$f(x) = a(x)$