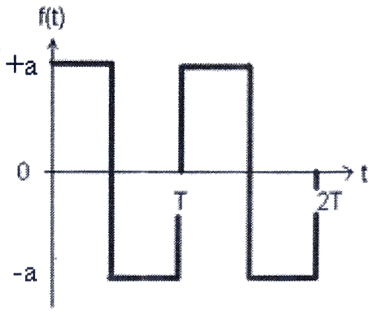
Week 2 Prelab

Calculate the ratio RMS/Vpp for the following signals. Show all your work!

Name: DENISE WANG

1. Square Wave: RMS / Vpp = ? $\frac{1}{2}$ UID: [redacted]



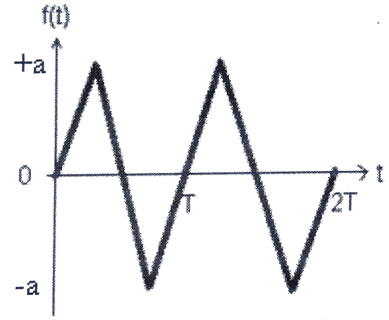
$V_{PP} = (A-(-A)) = A+A = 2A$

$V_{RMS}^2 = \frac{1}{T}\int_0^T f^2(t)\,dt = \frac{1}{T}\left[\int_0^{T/2} A^2\,dt + \int_{T/2}^{T}(-A)^2\,dt\right] = \frac{1}{T}\left[A^2(T/2-0) + A^2(T-T/2)\right] = \frac{A^2(T/2)+A^2(T/2)}{T}$

$V_{RMS}^2 = A^2$

$V_{RMS} = A$

2. Triangular Wave: RMS / Vpp = ? $\frac{1}{2\sqrt{3}}$



$V_{PP} = (A-(-A)) = 2A$

$V_{RMS}^2 = \frac{1}{T}\int_0^T f^2(t)\,dt = \frac{1}{T/4}\int_0^{T/4} f^2(t)\,dt = \frac{4}{T}\int_0^{T/4}\left(\frac{A}{(T/4)}t^2\right)^2 dt = \frac{A^2}{(T/4)^3}\int_0^{T/4} t^2\,dt$

$= \frac{4^3A^2}{T^3}\frac{t^3}{3}\Big|_0^{T/4} = \frac{4^3A^2}{3}\frac{T^3}{T^3 4^3} = \frac{A^2}{3}$

$V_{RMS} = \frac{A}{\sqrt{3}}$

3. If you see a difference by a factor of 10 between the oscilloscope reading and the function generator setting, where is the first place that you should look? Watch the Probe Setting video (https://youtu.be/dtSuTHIviSo) for the answer.

PEAK TO PEAK UNDER MEASUREMENTS WILL SHOW A TEN TO ONE DIFFERENCE BETWEEN WHAT YOU EXPECT AND WHAT YOU ARE GETTING. UNDER CHANNELS YOU WOULD SEE THE ATTENUATION PROBE CONNECTED TO THE OSCILLOSCOPE.

4. If you see a difference by a factor of 2 between the oscilloscope reading and the function generator setting, where is the first place that you should look? Watch the Function Generator Output Impedance video (https://youtu.be/-8Dv1oOjD9w) for the answer.

THE UTILITY BUTTON AND CHANNEL 1 WILL TELL YOU WHAT THE SCOPE THINKS THE LOAD IS.

5. Why would you ever want to use AC coupling on an oscilloscope? Watch the AC Coupling video (See CCLE) for the answer.

AC COUPLING SHOWS ONLY THE AC COMPONENT, AND SHOWS THE RIPPLE ON A POWER SUPPLY. IT REMOVES THE AVERAGE DC BIAS AND ALLOWS FOR AMPLICATION OF ONLY THE DEVIATIONS FROM THAT AVERAGE.

Week 2 Prelab End