Math Review

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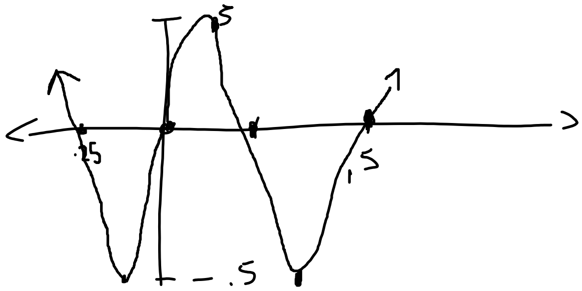
Math Review

Section 1: Sinusoids

1. Graph the function 0.5 $\sin(2\pi(2)t - \pi/2)$ by hand.



2. Consider the difference between $A \sin(2\pi f\, t + \phi)$ and $-A \sin(2\pi f\, t + \phi)$.
(a) Explain how $A \sin(2\pi f\, t + \phi)$ is transformed when the function is multiplied by -1.
    The graph is flipped over the x axis, or just phase shifted by π.

(b) Write an equivalent expression to $-A \sin(2\pi t + \phi)$ that does not use any negative signs. Note the frequency of 1. Hint: consider changing the phase!
    = A sin (-2πft - ϕ)
    = A sin (2πft - ϕ + π)

3. What is $\tan^{-1}(-\sqrt{3})$ if sin is negative?
(5π/3)

Section 2: Trig Identities
1. Show that csc(θ) cos(θ) tan(θ) = 1.
    = 1/sin(θ)cos(θ) tan (θ) = 1
    = cos (θ)/sin(θ) * sin(θ)/cos(θ) = 1
    = 1 = 1

2. Simplify (cot(x) cos(x)) / (tan(−x) sin(π/2 −x))
    = (cot(x)cos(x))/tan(-x)sin(π/2 - x)
    = (cot(x) cos(x))/tan(-x)cos(x)
    = cot(x)/-tan(x)
    = 1/tan^2(x)

3. Show that tan(x + y) = tan(x)+tan(y) / 1−tan(x) tan(y) starting from sin(x+y) / cos(x+y) and using sum and difference angle identities.
    = sin(x+y) / cos(x+y) = (sin(x)cos(y) + cos(x)sin(y)) / (cos(x) cos(y) - sin(x) sin (y))

    This is the most confusing equation I have ever tried to type up. Essentially, divide both sides by cos(x) and cos (y)

    = (sin(x)cos(y)/cos(x) cos (y) + cos(x) sin (y)/cos(x)cos(y)) / ((cos (x) cos (y) / cos(x) cos(y)) - (sin(x)

sin(y)/cos(x)cos(y)))
= sin(x)/cos(x) + sin(y)/cos(y) / sin(x) sin(y)/cos(x) cos(y)
= tan(x) + tan (y) / 1 - tan(x)tan(y)

Section 3: Summation Notation
1. 25
2

$$\sum_{n-1}^{\infty} \frac{A \sin(2\pi(n)ft)}{n^2}(-1)^{n-1}$$

3

$$\sum_{n=0}^{\infty} \left(\frac{1}{2n+1}\right)(-1)^{n-1}$$

Section 4: Complex Numbers
1. Find the solutions to z^2 = —4.
z = \sqrt{-4} = 2i

2. Consider x = 3 + 2i and y = 2 — i.
(a) What is x + y?
= 3 + 2i + 2 - i
= 5 - i

(b) What is xy?
= (3+2i)(2-i)
= 6 + 4i - 3i - 2i^2
= i + 8