

Pencil and Paper homework Number 2

- 1) a) Find all solutions to $\sin(3x) = \frac{1}{2}$ b) Find all solutions that lie in $[0, 2\pi]$. c) Find all solutions to $\tan(x - 1) = 1.5$. d) Find all solutions that lie in $[0, 2\pi]$.
- 2) a) Find all solutions of $e^{2x-1} = 4$. b) Find all solutions of $e^{-x^2} = .3$. c) Find all solutions of $\ln\left(\frac{x-1}{x-2}\right) = 1.5$.
- 3) Find the following limits. Four of the six are trivial.

a) $\lim_{x \rightarrow 3} (x^2 - 3x - 7)(x + 4)$

b) $\lim_{x \rightarrow 2} \frac{x^2 - 3}{x^2 + 5}$

c) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 + 5x + 6}$

d) $\lim_{x \rightarrow 2} \frac{x^2 + 5x + 6}{x^2 - 4}$

e) $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 4}$

f) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - 5x + 6}$

- 4) Find $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x}$ by substituting in for x the values 1, .1, .01, .001, .0001 and $-1, -.1, -.01, -.001, -.0001$. Note that the function is even so you only have to substitute in one set of values with a \pm sign. Make sure the calculator is in *Radian mode*. What value do the outputs approach? This is the limit. Present your work in a nice table form.
- 5) Same as problem 4) except that the limit is now $\lim_{x \rightarrow 0} \frac{\sin(7x)}{x}$. Present in nice table form. Would you care to make a conjecture about the value of $\lim_{x \rightarrow 0} \frac{\sin(kx)}{x}$?
- 6) Same as problem 4) except the limit is now $\lim_{x \rightarrow 0} \frac{1 - \cos(x)}{x}$. What does the limit appear to be?
- 7) Same as problem 4) except the limit is now $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$. What does the limit appear to be? This is an important limit.
- 8) Find $\lim_{x \rightarrow 2} \frac{\ln(x) - \ln(2)}{x - 2}$ by substituting in for x the values 3, 2.1, 2.01, 2.001, 2.0001 and 1, 1.9, 1.99, 1.999, 1.9999. What value do the outputs approach? This is the limit. Present your work in a nice table form.
- 9) Find $\lim_{x \rightarrow 3} \frac{\ln(x) - \ln(3)}{x - 3}$ by substituting like you did in 8) but now you have to figure out the numbers to substitute. Do you see a pattern? Care to guess what

$$\lim_{x \rightarrow k} \frac{\ln(x) - \ln(k)}{x - k}$$

might be?

Note. You can do the above problems really easily by putting the functions into the grapher, hitting *trace* and then typing in the inputs. It will then show you the outputs. Saves a lot of typing.