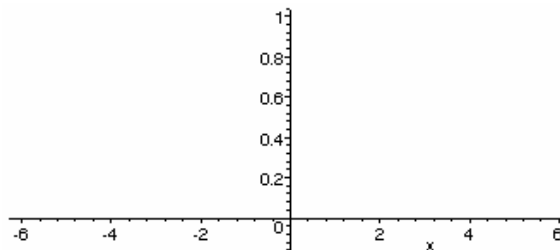


Assignment 4: Trigonometry and Exponentials (0.4&5) Name _____
Please provide a handwritten response.

1a. In *Maple*, $\sin x$ is expressed as `sin(x)`, and the constant $\pi \approx 3.14$ is denoted by `Pi`. We can plot the sine function over the domain $-2\pi \leq x \leq 2\pi$ using the command

```
plot(sin(x), x=-2*Pi..2*Pi);
```

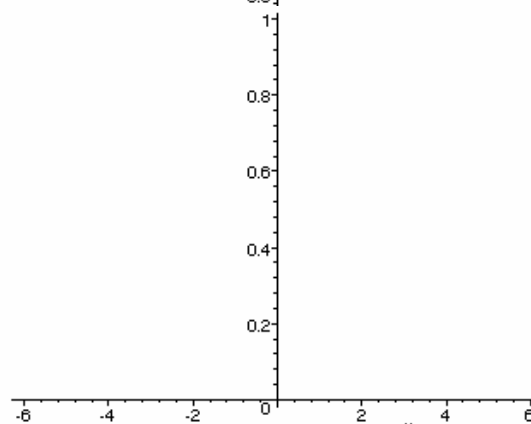
Execute this command and sketch the result on the axes at right.



1b. More complicated trigonometric functions can also be used, but they are not always written in *Maple* as they would be in traditional mathematical notation. For example, the function $y = \sin^2 x$ would be plotted over the domain $-2\pi \leq x \leq 2\pi$ using the command

```
plot(sin(x)^2, x=-2*Pi..2*Pi);
```

(Note where the exponent goes!) Execute this command and sketch the result on the axes at right.



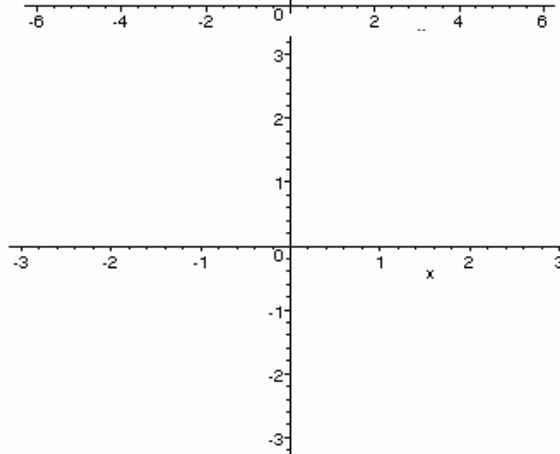
1c. The cosine function $\cos x$ is represented in *Maple* by `cos(x)`, and the tangent function $\tan x$ by `tan(x)`. So, the function $f(x) = \cos 5x + 3\sin 5x$ would be represented by

```
f:=x->cos(5*x)+3*sin(5*x);
```

execute this command followed by

```
plot(f(x), x=-Pi..Pi);
```

and sketch the result on the axes at right.



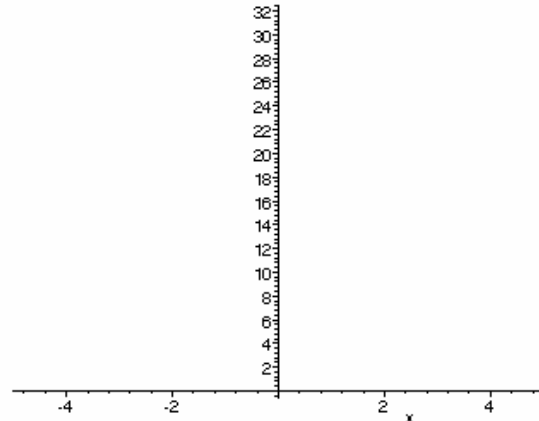
1d. All six trigonometric functions in *Maple* assume that the variable is measured in radians, not degrees. Execute the commands `sin(Pi/2)`; `cos(Pi/4)`; and `tan(-Pi/3)`; and record the results below; were the answers what you would expect?

2. The `convert` command can be used to express degree measure. For example, execute the command `sin(convert(60*degrees, radians))`; to find $\sin 60^\circ$; is the result correct?

3a. Exponential functions in *Maple* are expressed using the \wedge symbol just like any other exponent. For example, the function $y = 2^x$ would be plotted over the domain $-5 \leq x \leq 5$ using the command

```
plot(2^x, x=-5..5);
```

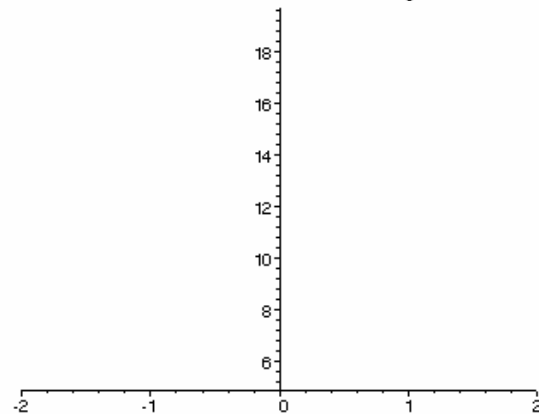
Execute this command and sketch the result on the axes at right.



3b. The special constant $e \approx 2.7$ is represented in *Maple* by `exp(1)`, and the function e^x is represented by `exp(x)`; for example, to graph $f(x) = 10e^{-x/3}$ execute the command

```
plot(10*exp(-x/3), x=-2..2);
```

and sketch the result on the axes at right.



4. In *Maple* the natural logarithm function $\ln(x)$ is represented by `ln(x)` whereas the logarithm of x with base b , $\log_b(x)$, is denoted by `log[b](x)` (the b comes first!) Execute the command

```
plot([ln(x), log[.5](x)],  
      x=0..4);
```

to plot the functions $\ln(x)$ and $\log_{1/2}(x)$ together on the same axes, and sketch the result on the axes at right. Label which graph is which!

