# Intro R Pt 2 - Econ 520

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## Exercise 1

*Let $z = (z_1, z_2, ..., z_40)'$ where $z_i = i$. Calculate the following:*

(a) $z'z$

```
z = seq(1,40)

t(z) %*% z
```

```
##       [,1]
## [1,] 22140
```

(b) $\sum_{i=1}^{40} (\frac{1}{3})^{z_i}$

```
summation = rep(0,length(z))
for(i in 1:length(z)){
  summation[i] = (1/3)^z[i]
}
sum(summation)
```

```
## [1] 0.5
```

```
## Or alternativelY:

sum((1/3)^z)
```

```
## [1] 0.5
```

(c) $\sum_{i=1}^{40} e^{z_i}$

```
sum(exp(z))
```

```
## [1] 3.72374e+17
```

(d) $\sum_{i=1}^{40} z_i(z_i - 1)$.

```
sum(z*(z-1))
```

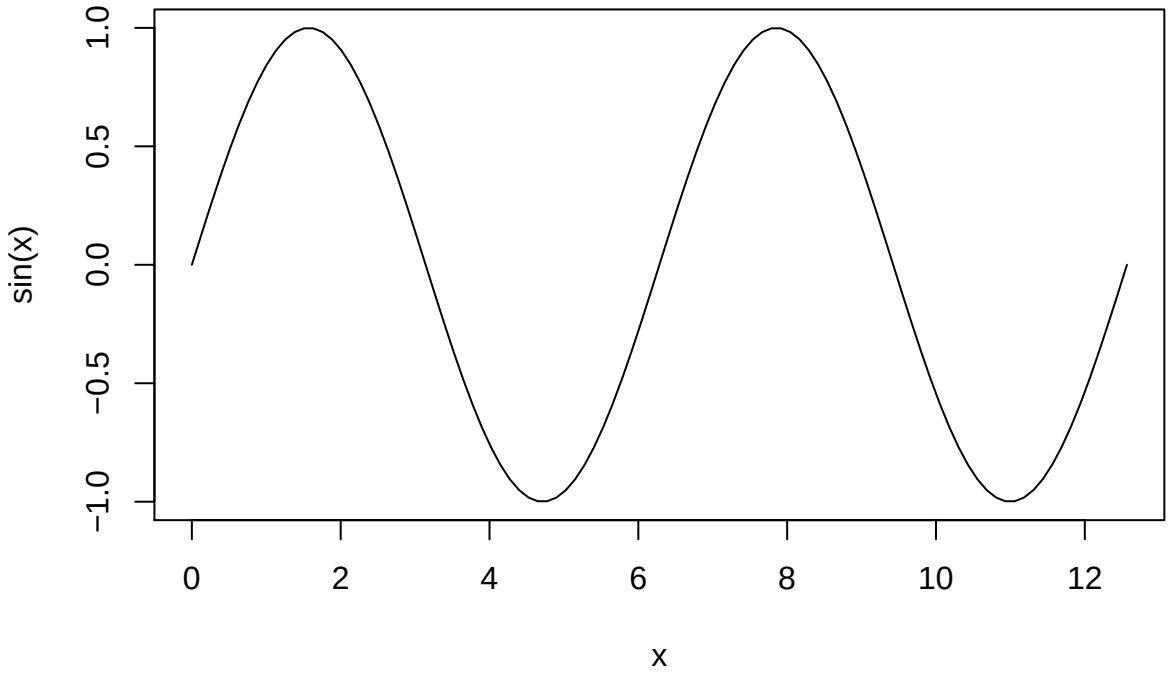
```
## [1] 21320
```

## Exercise 2

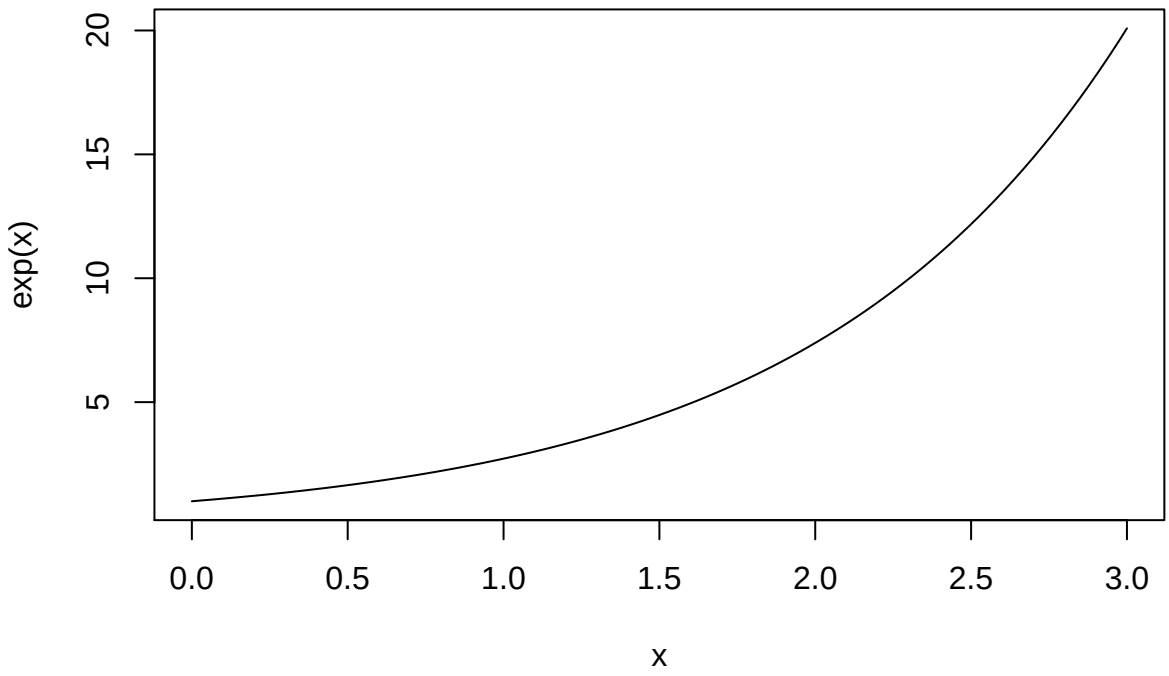
*Plot the following functions*

(a) $\sin^2(x)$ over $[0, 4\pi]$
(b) $e^{-x}$ over $[0, 3]$.

```
curve(sin(x), from=0, to = 4*pi)
```




```
curve(exp(x), from=0, to=3)
```




### Exercise 3

$$\Omega = \{1, 2, 3, 4\}$$
$$P(1) = 0.1, P(2) = 0.4, P(3) = 0.3, P(4) = 0.2$$
$$P(1) + P(2) + P(3) + P(4) = 1$$

This gives a sample space of oucomes and assigns each outcome a number (its a random variable). The sum of the probabilities of the events equal 1.

$$P(X < 4)$$

This asks for the probability of an event occuring that is less than 4. It shows the potential outcome with three `true` and one `false`.

That actual numerical probability for this event is as follows:

$$P(X < 4) = 0.8$$

Now, we seek the partition of the sample space that is greater than 1.

$$P(X > 1)$$

Then, we find three out of the four outcomes fit this restriction. Next, we have:

$$P(1 < x < 4)$$

Of course, there are two remaining outcomes that could work here, $2, 3$. Which is exactly what the boolean values tell us.

Lastly, we assign a numerical probability to the outcome:

$$P(1 < x < 4) = 0.7$$