

# The Number $e$

11-3

Comparing  $y = 2^x$  with  $y = 3^x$  we see that with the increased value for  $b$ , from 2 to 3, we get a steeper graph. Note that both graphs still contain the point  $(0, 1)$  as  $1 = 2^0$  and  $1 = 3^0$ .

As the graph changes in its steepness, ~~at~~ we can draw a tangent line passing through  $(0, 1)$  and calculate the slope of the tangent line.

By inspection of  $y = b^x$  on graphs determine a second point on the tangent line and calculating the value of  $m$ .

| $b$ | $m$   |
|-----|-------|
| 0.5 | -0.69 |
| 1   | 0     |
| 2   | 0.69  |
| 3   | 1.1   |
| 4   | 1.4   |

Note that between  $b=2$  and  $b=3$ ,  $m=1.0$ . This value for the base where the slope is equal to 1 is called  $e$ .  $e \approx 2.718$

$e$  is an irrational number just like  $\pi$ .

$f(x) = e^x$  is an exponential curve that includes the point of  $(0, 1)$  with a slope of 1 at that point.

