



APPROXIMATIONS

- small θ
- θ in radians

$$\sin(\theta) \approx \theta$$

$$\cos(\theta) \approx 1 - \frac{1}{2}(\theta)^2$$

$$\tan(\theta) \approx \theta$$


FURTHER APPROXIMATIONS

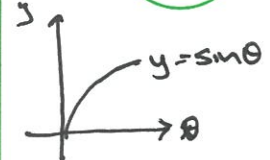
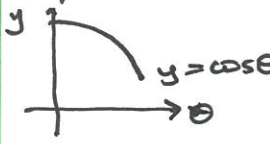
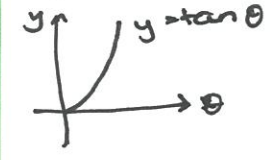
θ^3 and higher can be ignored.
 θ is small, θ^2 is even smaller.

The 'dominant' term is the constant.

% ERROR

$$\frac{\text{True} - \text{Approx}}{\text{True}}$$



APPROXIMATIONS SMALL ANGLES

1	2	3	4	5
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(a) Find an approximation for $\sin(\frac{\pi}{6} + \theta)$ valid for θ small enough so terms in θ^3 and above can be ignored.

(b) The % error for $\sin \theta$ is 1%. Show that $100\theta = 101 \sin \theta$

(a) $\sin(\theta + \frac{\pi}{6}) \neq \frac{\pi}{6} + \theta$ ←

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≈

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≈

(b) _____ = 0.01

$$\theta - \sin \theta = 0.01 \sin \theta$$

$$\theta = 1.01 \sin \theta$$

$$100\theta = 101 \sin \theta$$

