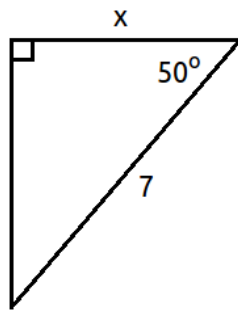


**Trigonometry and Calculus Review**

1. Compute  $\lim_{x \rightarrow 0} \frac{x}{\tan x}$ .
2. Compute  $\lim_{t \rightarrow \infty} \left(1 + \frac{7}{t}\right)^t$ .
3. Find  $\frac{d^2 y}{dt^2}$  if  $y = \arctan t$ .
4. Find  $f'(x)$  if  $f(x) = \ln(\ln(\ln(x)))$ .
5. Find  $\frac{dy}{dx}$  if  $y = x^3 \cos(2x)$ .
6. Find the maximum value of  $g(x) = x e^{-x}$  in the interval  $[0, 5]$ .
7. Compute  $\int_1^{\infty} \frac{dx}{x^2 + 4}$ .
8. Compute  $\int_e^{e^2} \frac{dx}{x(\ln x)^2}$ .
9. Find  $\int x e^{5x} dx$ .
10. Find all angles  $\theta$  in  $[0, 2\pi)$  for which  $\sec \theta = 2$ .
11. Find  $\theta$  in  $(-\frac{\pi}{2}, \frac{\pi}{2})$  such that  $\sqrt{3} \sin \theta = \cos \theta$ .
12. Find  $x$



As far as calculus goes, you need to know basic rules of differentiation (chain rule, product rule, etc) and basic methods of integration: substitution (including trig substitution), integration by parts, integration of rational functions with quadratic denominator. Don't forget  $+C$ !