

1. Sand is pouring onto a conical pile at a rate of  $6\text{ft}^3/\text{min}$ . The coefficient of friction is such that the diameter is twice the height. At what rate is the height changing when the height is 8 ft?
2. Write the Taylor Series for  $y = \cos x$  centered at  $x = \frac{\pi}{4}$ . Show at least 5 terms.
3.  $f(x) = 2x^3 + 3x^2 - 12x$  Show your Work and Find the Relative Extrema.
4.  $f(x) = 3x + \sin(2x)$  Write the Equation of the tangent line at  $x = \pi$ .
5.  $f(x) = (x^2 - 4x)^{2/3}$ . Find the relative extrema.
6.  $f(x) = \frac{3x^2}{x^2 + 1}$  Find the intervals where  $f(x)$  is increasing and where  $f(x)$  is decreasing.
7.  $f(x) = x^3 - 3$  Find the relative extrema.
8.  $f(x) = \sqrt{2 - x}$ . Find the value of  $c$  referred to by the MVT on  $[-7, 2]$
9.  $xy + 2x = 3y$  Find  $\frac{dy}{dx}$ .
10.  $f(x) = x^3 + 3x^2 - x - 1$  Find the  $x$ -coordinate that gives the minimum value on  $[-4, 2]$ .