

(1) Differentiate the following functions.

(a) $f(x) = \cos x^2$

(b) $f(x) = \cos \pi x$

(c) $g(t) = (t - 1)^8$

(d) $h(t) = (t^2 + t + 1)^{17}$

(e) $h(t) = (t + \frac{1}{t})^{\frac{1}{4}}$

(f) $f(x) = \sec 4^x$

(g) $g(s) = \sqrt{\cos s}$

(h) $\ell(x) = \sin \frac{1}{x}$

(i) $m(x) = e^x \sin x$

(j) $f(x) = ((7x)^3)^{\frac{1}{4}}$

(k) $h(u) = (5u - \frac{1}{u})^3$

(l) $k(u) = \sin((5u - \frac{1}{u})^3)$

(m) $n(x) = 2^{3x+1} \sin \frac{1}{x}$

(n) $\mathbf{r}(t) = (\tan(3t + 1), \frac{\pi}{e^t})$ (a vector function)

(2) Find the tangent line at the indicated point.

(a) $y = 2^{x^2}$ at $x = 2$