1. Explain which answer is in a sentence or two.

   (a) A freight train is traveling along a straight track. The distance in miles it has traveled after t hours is given by a function $f(t)$. An engineer is walking through the cars at a rate of 3 miles per hour, in the same direction as the train is moving. The speed of the engineer relative to the ground is

   A. $f(t) + 3$
   B. $f'(t) + 3$
   C. $f(t) - 3$
   D. $f'(t) - 3$

   (b) A leaky faucet drips one milliliter to the volume of water in a tub at exactly one second intervals. Let $v(t)$ be the function giving the volume of water in the tub at time t seconds after the first drip. (This leak is the only water being added to the tub.)

   A. $v(t)$ is continuous at every time t.
   B. $v(t)$ is continuous for all t except for t a positive integer.
   C. $v(t)$ is not continuous at any time t.
   D. There is not enough information to know where $v(t)$ is continuous.

   (c) $\frac{d}{dx}(e^8)$ equals

   A. 8
   B. $8e^7$
   C. e^8
   D. 0

   (d) At $(0, 0)$, the graph of $f(x) = |x|$

   A. has a tangent line at $y = 0$
   B. has infinitely many tangent lines
   C. has no tangent line
   D. has two tangent lines, $y = -x$ and $y = x$

2. Find the derivatives of the following functions:

(a) $p(t) = \dfrac{3t-2}{t^2+6}$

(b) $A(r) = \dfrac{\pi r^2}{1+\dfrac{1}{6}r^2+\dfrac{1}{24}r^4}$

(c) $m(x) = \sin(x) \cdot e^x$

(d) $g(x) = \dfrac{\sin(x)}{1 + x^2}$

(e) $R(x) = 3^{x+\sin(x)}$

(f) $h(z) = \dfrac{\sqrt[3]{z}}{1 - z + z^3}$