(1) [5] Let $f(x) = 2 + x$ and $g(x) = 4 - x^2$. Determine and simplify $\left(\frac{f}{g}\right)(x)$ and state the domain.

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{2+x}{4-x^2}$$

$$= \frac{2+x}{(2-x)(2+x)}$$

$$= \boxed{\frac{1}{2-x}}$$

Domain of $f(x)$: $(-\infty, \infty)$

Domain of $g(x)$: $(-\infty, \infty)$

$g(x) = 0$ at $x = 2, -2$

∴ Domain of $\left(\frac{f}{g}\right)(x)$ is $\boxed{(-\infty, -2) \cup (-2, 2) \cup (2, \infty)}$

(2) [5] Let $H(x) = \sec^4(\sqrt{x})$. Find functions f, g and h so that $H = f \circ g \circ h$.

$h(x) = \sqrt{x}$

$g(x) = \sec(x)$

$f(x) = x^4$

(3) [5] A stone is dropped into a lake, creating a circular ripple which travels outward at a speed of 50 cm/s. Determine $A(t)$, the area of the circle as a function of time t. (Hint: first determine $r(t)$, the radius of the circle as a function of time.)

$r(t) = 50t$

$A = \pi r^2$, so $A(t) = \pi (r(t))^2$

$= \pi (50t)^2$

$= \boxed{2500\pi t^2}$