Question 1:

(a)[5 points] Evaluate: $\displaystyle\lim_{x\to\pi}\frac{\sin^2\left(\frac{x}{2}\right)}{x-\pi}$

(b)[5 points] Let $f(x)=\dfrac{1}{x+2}$. Evaluate and simplify the difference quotient $\dfrac{f(a+h)-f(a)}{h}$.

Question 2:

(a)[5 points]   Evaluate: $\displaystyle\lim_{t\to 0}\frac{\sin{(7t)}}{\tan{(3t)}}$

(b)[5 points]   Evaluate: $\displaystyle\lim_{x\to 0} x^6 \cos\left(\frac{6}{x}\right)$

(the Squeeze Theorem may help here).

Question 3:

(a)[**5 points**]   Evaluate: $\displaystyle\lim_{x \to 16} \frac{4 - \sqrt{x}}{x - 16}$

(b)[**5 points**]   Evaluate: $\displaystyle\lim_{x \to -3^-} \frac{3x + 9}{|x + 3|}$

Question 4:

(a)[**5 points**]   Evaluate: $\lim\limits_{x \to 4} \dfrac{\sqrt{x^2 + 9} - 4}{x^2 - 3x - 3}$

(b)[**5 points**]   Evaluate: $\lim\limits_{x \to -5} \dfrac{x^2 + 3x - 10}{x^2 + 7x + 10}$

Question 5:

(a)[3 points]   A right angle triangle has base b and height h which add to 12. Express the area A of the triangle as a function of the base b.

(b)[3 points]   Let $H(x) = \csc^2\left(\sqrt{x^2+1}\right)$ and $h(x) = x^2$. Find functions f and g so that $H = f \circ g \circ h$. (There are several possible correct answers.)

(c)[4 points]   Let $f(x) = \dfrac{1}{x^2}$ and $g(x) = \dfrac{x}{\sqrt{x-1}}$. Determine, simplify, and find the domain of $(f \circ g)(x)$.