Definition of a Limit Exercises

These exercises have been written to consolidate your understanding of the Definition of a Limit workshop.

Question 1

For each of the following limits, find $\delta$ in terms of $\epsilon$.

(a) $\lim_{x \to 2} x + 2 = 4$
(b) $\lim_{x \to 5} 2x - 3 = 7$
(c) $\lim_{x \to 2} 4x + 3 = 11$
(d) $\lim_{x \to 1} 6 - 2x = 4$
(e) $\lim_{x \to 6} x^2 - 30 = 6$
(f) $\lim_{x \to 2} \frac{1}{x} = \frac{1}{2}$
(g) $\lim_{x \to 9} \frac{1}{x} - 3 = \frac{1}{6}$
(h) $\lim_{x \to 2} \frac{1}{2x + 1} = \frac{1}{5}$

Question 2

Use the definition of a limit to prove each of the above limits.
Question 3

Use the definition of a limit as $x \to \pm \infty$ to prove each of the following limits.

(a) $\lim_{x \to \infty} \frac{1}{x} + 2 = 2$

(b) $\lim_{x \to \infty} \frac{1}{3 + x} = 0$

(c) $\lim_{x \to \infty} \frac{3x + 2}{3x + 4} = 1$

(d) $\lim_{x \to -\infty} \frac{1}{x^3} = 0$

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