Solutions to QUIZ 4A

1. Plug in \( x = 2 \) to get: \( \frac{2+12-6}{2-4} = -4 \)

2. Factor to get:

\[
\lim_{x \to -1} \frac{(x - 4)(x + 1)}{x + 1} = \\
\lim_{x \to -1} (x - 4) = -1 - 4 = -5
\]

3. Rational function - looking for a limit towards \( -\infty \)... compare highest powers of \( x \) in the numerator and denominator... denominator has the highest power so the limit is 0.

4. As \( x \to \infty \), \( e^x \to \infty \) and \( e^{-x} \to 0 \)
Divide every term by \( e^x \) and then take the limit to get \( \frac{1}{3} \).

5. \( \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{3(x + h)^2 - 3x^2}{h} = \\
\lim_{h \to 0} \frac{3x^2 + 6xh + 3h^2 - 3x^2}{h} = \lim_{h \to 0} \frac{6xh + 3h^2}{h} = \\
\lim_{h \to 0} \frac{h(6x + 3h)}{h} = \lim_{h \to 0} (6x + 3h) = 6x + 0 = 6x \)

Solutions to QUIZ 4B

1. Plug in \( x = 1 \) to get: \( \frac{1+3-6}{1-4} = \frac{2}{3} \)

2. Factor to get:

\[
\lim_{x \to -2} \frac{(x + 3)(x - 2)}{x - 2} = \\
\lim_{x \to -2} (x + 3) = 2 + 3 = 5
\]

3. Rational function - looking for a limit towards \( -\infty \)... compare highest powers of \( x \) in the numerator and denominator... the highest powers are equal \( (x^2) \) so the limit is \( 3/8 \).

4. As \( x \to -\infty \), \( e^x \to 0 \) and \( e^{-x} \to \infty \)
Divide every term by \( e^{-x} \) and then take the limit to get -4.

5. \( \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{7(x + h)^2 - 7x^2}{h} = \\
\lim_{h \to 0} \frac{7x^2 + 14xh + 7h^2 - 7x^2}{h} = \lim_{h \to 0} \frac{14xh + 7h^2}{h} = \\
\lim_{h \to 0} \frac{h(14x + 7h)}{h} = \lim_{h \to 0} (14x + 7h) = 14x + 0 = 14x \)