Limits *Answer Key*

1) Answer: D

Explanation: Since x = -3 will not make $2x^2 + 3x - 1$ undefined when substituted, then we can apply the substitution method to determine $\lim_{x \to -3} 2x^2 + 3x - 1$.

Let us substitute x = -3 to the function to evaluate the limit:

$$\lim_{x \to -3} 2x^2 + 3x - 1 = 2(-3)^2 + 3(-3) - 1 = 8.$$

Hence, the limit is 8.

2) Answer: B

Explanation: If we try to evaluate $\lim_{x \to 2} \frac{x^2 - 4x + 4}{x - 2}$ using the substitution method, we will obtain the indeterminate form 0/0. For this reason, we need to use the factoring method to evaluate the limit.

$$\lim_{x \to 2} \frac{x^2 - 4x + 4}{x - 2}$$

$\lim_{x \to 2} \frac{(x-2)(x-2)}{x - 2}$ *factoring the numerator*

$\lim_{x \to 2} x - 2$ *cancel out the common factor x - 2*

(2) - 2 = 0 *substitute x = 2 to x - 2*

Hence, the limit is 0.

3) Answer: B

Explanation: Note that for every function *f(x)* = $\frac{c}{x}$ where c > 0, the value of *f(x)* as *x* approaches 0 from the left tends to get smaller and smaller. On the other hand, if x approaches 0 from the right, the value of *f(x)* tends to get larger and larger. Only option B captures this property.

Note that C is not the correct answer since the limit of the function is not always the result when you evaluate the limiting value of the function.

4) Answer: A

Explanation: We can apply the substitution method for this problem since x = 1 will not make the value of the function 3 - ⅕ x^2 iwhen substituted.

By substitution method:

$$\lim_{x \to 1} 3 - 1/5\,x^2 = 3 - 1/5(1) = 3 - 1/5 = 15/5 - 1/5 = 14/5$$

Thus, the limit is 14/5.

5) Answer: B

Explanation: If we try to apply the substitution method to evaluate the limit (substituting x = 5 to the given function), the computed value will be the indeterminate form 0/0.

For this reason, we have to use the factoring method:

$$\lim_{x \to -5} \frac{25 - x^2}{x + 5}$$

$$\lim_{x \to -5} \frac{(5 - x)(5 + x)}{x + 5}$$ *factoring the numerator (difference of two squares)*

$$\lim_{x \to -5} 5 - x$$ *cancel out the common factor x + 5 (note that 5 + x is the same with x + 5)*

5 - (-5) = 10 *by substitution method*

Thus, the limit of the function is 10.