



Quiz # 5
Math 101-Section 01 Calculus I
9 March, 2018, Friday
Instructor: Ali Sinan Sertöz
Solution Key



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Name:

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Student ID:

Q-1) Let $f(x) = \frac{x^2 - 1}{x^2 + 1}$.

- (i) Calculate, and simplify $f'(x)$.
- (ii) Calculate, and simplify $f''(x)$.
- (iii) On what intervals is f concave upward? Concave downward?

Answer:

(i)
$$f'(x) = \frac{4x}{(x^2 + 1)^2}$$

(ii)
$$f''(x) = -4 \frac{3x^4 + 2x^2 - 1}{(x^2 + 1)^4} = -4 \frac{(3x^2 - 1)(x^2 + 1)}{(x^2 + 1)^4} = -4 \frac{3x^2 - 1}{(x^2 + 1)^3}$$

(iii)
 f is concave down on $(-\infty, -\frac{1}{\sqrt{3}})$ and on $(\frac{1}{\sqrt{3}}, \infty)$.

And f is concave up on $(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}})$.