Math1210 Quiz 9 (2.9-3.2) Summer, 2009 Dylan Zwick

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Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated. (You may use your calculator.)

1. (10 points) Identify all the critical points.

$f(x)=x^5-\frac{25}{3}x^3+20x-1$ on [-3, 2]

$f'(x) = 5x^4 - 25x^2 + 20$

Differentiable everywhere, so no singular points.

$f'(x) = 0 \Rightarrow 0 = 5x^4 - 25x^2 + 20$

$\Rightarrow 0 = x^4 - 5x^2 + 4 \Rightarrow 0 = (x^2-4)(x^2-1)$

$x = \pm 2, \; x = \pm 1$ are critical points. (Stationary points.)

$f(-3) = -79 \quad f(-2) = -\frac{19}{3} \quad f(-1) = -\frac{41}{3} \quad f(1) = \frac{35}{3} \quad f(2) = \frac{13}{3}$

Critical points: $-3, -2, -1, 1, 2$

Absolute (or global) maximum point: $x = 1, \; y = \frac{35}{3}$

Absolute (or global) minimum point: $x = -3 \quad y = -79$

2. (12 points) For $y=x^4+2x+1$, if x changes from 2 to 2.005, approximately how much does y change?

$dy = (4x^3+2)dx \qquad x = 2 \quad dx = .005$

$dy = (34)(.005) = .17$

Answer 2: $\Delta y \approx \boxed{dy = .17}$