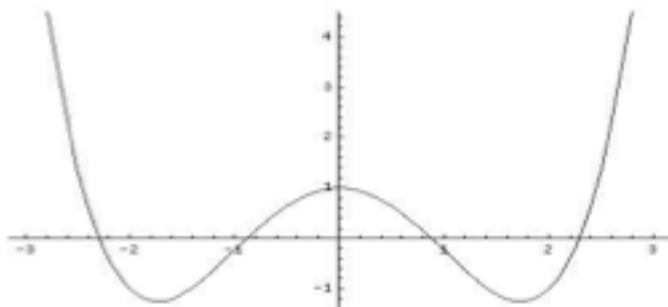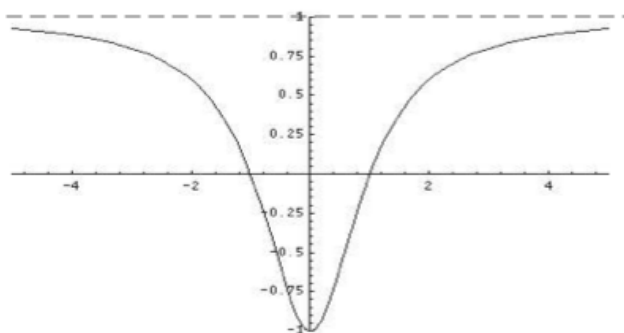**Math 152 – Sample Exam 2 Brief Answers – Spring 2016 – Louis Gross**
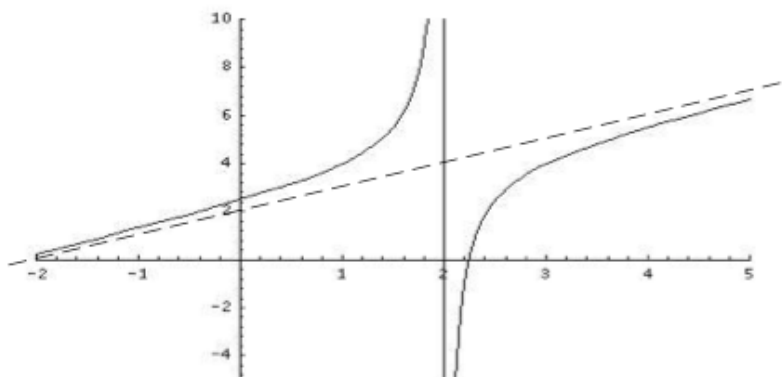
1. (a) Relative minima occur at (-√3,-5/4) and (√3, -5/4), a relative maximum occurs at (0,1), and inflection points occur at (-1, -1/4) and (1, -1/4)

 (b) Relative minimum at (0,-1), inflection points at (-1/√3, -1/2), (1/√3, -1/2), horizontal asymptote is y=1

(c) no maximum or minimum points, no inflection points. Vertical asymptote at x=2 and asymptotes to the line y=x+2 as $x \to \infty$ and as $x \to -\infty$

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2. $20/\pi = 6.37$ cm

3. (a) largest value is 5 at x=1 and smallest value is 4 at x=2
   (b) largest value is ½ at x=1 and smallest value is – ½ at x=-1

4. (a) $T'(t) = -k(T(t) - 15)$ where $k = \dfrac{\ln 3}{10} = .11$ and T(0)=30

   (b) $T(t) = 15 + 15e^{-kt} = 15 + 15(3^{-t/10})$ so T(20)=16 2/3

5. $S^* = \dfrac{1}{b}$

6. (a) Concave up for $x < 2 - \sqrt{2}$ and $x > 2 + \sqrt{2}$, Concave down for $2 - \sqrt{2} < x < 2 + \sqrt{2}$
   Inflection points occur at $x = 2 - \sqrt{2}$ and at $x = 2 + \sqrt{2}$

   (b) Concave down for $0 < x < \dfrac{1}{2}$ and concave up for $x > \dfrac{1}{2}$ and an inflection point

occurs when x= ½

7. (a) $f'(x) = 6\cot(3x + 2)$

   (b) $g'(x) = 12x^2 + 10x + \dfrac{1}{2\sqrt{3x^3}}$

8. (a) $y = 4x - 4$

   (b) $y = -\dfrac{\pi}{4}x + \dfrac{\pi}{2}$

9. $\displaystyle\lim_{h \to 0} \frac{f(4+h) - f(4)}{h} = \lim_{h \to 0} \frac{(h+4)^3 e^{(h+4)^2} - 64e^{16}}{h}$

or

$\displaystyle\lim_{x \to 4} \frac{f(x) - f(4)}{x - 4} = \lim_{x \to 4} \frac{x^3 e^{x^2} - 64e^{16}}{x - 4}$