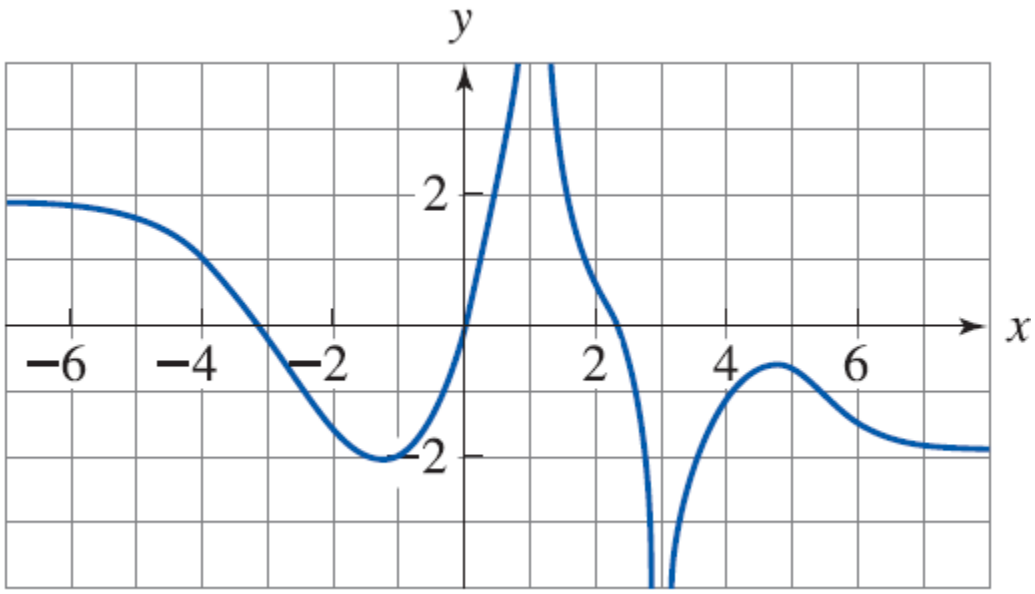
Calc 1 Final Exam Review

1) For the function *f* whose graph is given, state the following:



a) $\lim_{x\to\infty} f(x)$

b) $\lim_{x\to-\infty} f(x)$

c) $\lim_{x\to 1} f(x)$

d) $\lim_{x\to 3} f(x)$

e) What are the asymptotes of the function?

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Differentiate the following functions 2 – 6:

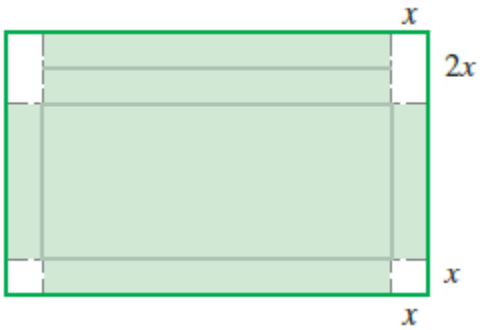
2) $g(x) = \frac{5}{8}x^2 - 8x + 17$
3) $f(x) = \left(x + 7\sqrt{x}\right)e^x$
4) $m(x) = \frac{\sqrt[3]{x}}{x-3}$
5) $y = \frac{2x}{9-\tan(x)}$
6) $n(x) = \left(\frac{x^3-2}{x^3+2}\right)^8$

7) Find the equation of the tangent line at (2, 1):
$x^2 + 6xy + 12y^2 = 28$

8) Find the limit:
$\lim_{x\to 1} \frac{\sin(x-1)}{x^3 + 2x - 3}$

9) Given the function $f(x) = \frac{x-4}{x^2}$ answer the following questions:
   a. What is the domain of the function?
   b. What is the x-intercepts?
   c. What is the y-intercepts?
   d. Find the interval on which *f* is increasing?
   e. Find the interval on which *f* is decreasing?
   f. Find the interval on which *f* is concave up?
   g. Find the interval on which *f* is concave down?
   h. Find the local maximum for *f*?
   i. Find the local minimum for *f*?

10) A box with an open top is to be constructed from a 7 ft by 6 ft rectangular piece of cardboard by cutting out squares or rectangles as shown in the figure and bending up the sides. Find the largest volume the box can have.



11) A boat leaves the dock at 1pm and travels due south at a speed of 20 km/h. Another boat has been heading due east at 15 km/h and reaches the same dock at 2pm. How many minutes after 1pm were the two boats closest together?

Find the integral of the following functions 12-14:

12) $\int_1^{16} x^{-\frac{3}{4}}\,dx$

13) $\int (x^{1.3} + 11x^{4.5})\,dx$

14) $\int \frac{e^x}{(7-e^x)^2}\,dx$