

Alternate Exam 2

Name _____

Math 143

Spring 2008

April 23, 2008

Show all work and simplify all answers. There are 3 pages and 100 points: budget your time on each problem effectively. NPC means no partial credit.

1. [29 points] Many problems are limited or no partial credit, so double check your answers.

- (a) [5 points] The function f is a linear function, with $f(10) = 7$ and $f(20) = 15$. What is $f(0)$? [Hint: You do not need to find a formula for f .]

$$f(4) = \underline{\hspace{4cm}}$$

- (b) [5 points] What are the exact x -intercepts of the parabola $y = -x^2 + 4x + 1$? Simplify your answer.

- (c) [4 points] Describe the large-scale behavior of $y = -2x^4 + 100x^3 - 19$ by drawing a sketch (unknown middle plus two tails going up or down) as we did in class.

- (d) [3 points] Describe the shape of the graph $y = (x - 2)(x + 19)^3$ near $x = -19$.

- (e) [6 points] Find all asymptotes to the graph of the rational function $f(x) = \frac{9x + 4}{17x - 2}$. Give the exact equation of each line. If there is none, write "none" in the blank.

Horizontal asymptotes: _____

Vertical asymptotes: _____

- (f) [6 points] Find the domain and range of the cubic polynomial $f(x) = ax^3 + bx^2 + cx + d$ (where $a \neq 0$).

Domain: _____

Range: _____

2. [15 points] Let x denote temperature on the Celsius scale, and let y denote the corresponding temperature on the Fahrenheit scale.

(a) Find a linear function relating x and y ; use the facts that 32°F corresponds to 0°C and 212°F corresponds to 100°C . Write the function in the form $y = Ax + B$.

(b) What Celsius temperature corresponds to 65°F ?

3. [15 points] The graph of $y = -x^2 + 4x + 5$ is a parabola.

(a) Complete the square to put the parabola in vertex form. Show all steps.

(b) The graph of $y = -x^2 + 4x + 5$ is a shift of the parabola _____,

and the vertex is _____. [For the first blank you are supposed to put a parabola of form $y = ax^2$.]

4. [10 points] A baseball is thrown straight upward, and its height as a function of time is $h = -16(t - 1)^2 + 16$, where h is in feet and t is in seconds. Find the maximum height of the ball and the time at which that height is attained. Include units in your answer.

maximum height _____

attained at _____

5. [10 points] The hypotenuse of a right triangle is 15 cm. Express the area A of the triangle as a function of the length x of one of the legs.

$$A = \underline{\hspace{10cm}}$$

6. [21 points] Let $g(x) = \frac{x^2 - 3x}{x + 1}$.

- (a) [5 points] Determine all x - and y -intercepts for the graph of g . If there are none, write “none” in the blank.

x -intercepts $\underline{\hspace{10cm}}$

y -intercepts $\underline{\hspace{10cm}}$

- (b) [9 points] Give the equations of all asymptote lines to the graph of g . If there are none, write “none” in the blank.

horizontal asymptotes $\underline{\hspace{10cm}}$

vertical asymptotes $\underline{\hspace{10cm}}$

slant asymptotes $\underline{\hspace{10cm}}$

- (c) [7 points] Graph g , using your graphing calculator and the information you found in parts (a) and (b). Show scale on your axes. Choose a window that shows all of the important features of the graph. Include all asymptotes in your picture.