MATH 1143 EXAM ON CHAPTER 4
OCTOBER 14, 2011

Instructions. Be sure to show your work! A correct solution with no supporting work might receive no credit. Give numerical answers in exact form, such as $5/7$ or $3\sqrt{5}$, unless the problem asks for a decimal approximation. There are 35 points altogether.

(2 pts) 1. Suppose that f is a linear function. If $f(0) = 3$ and $f(10) = 5$, determine $f(6)$.

(3 pts) 2. The price of a new machine is \$17,000. After 12 years, the machine will have a salvage value of \$2000. Assuming linear depreciation, determine its value after one year and after two years. If you do that without obtaining a general formula for the value $V(t)$ after t year, that is fine, but explain your reasoning.

t	Value after t years
0	\$ 17,000
1	
2	

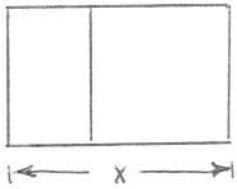
(2 pts) 3. Complete the square for the function $g(t) = 4t^2 - 20t$.

(4 pts) 4. The parabola $y = -x^2 + 8x + 5$ has vertex $(4, 21)$. *Use that fact* to determine the maximum values of the following functions and the inputs that give those values. (Note: Just interpret; don't launch into a calculation. Doing so would only tell you what you already know—that the high point of the parabola was $(4, 21)$.)

(a) $f(x) = \sqrt{-x^2 + 8x + 5}$

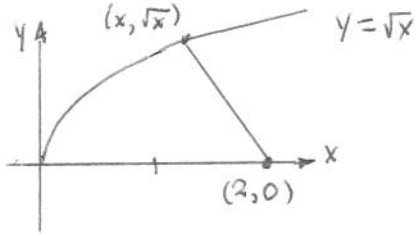
(b) $g(x) = -x^4 + 8x^2 + 5$

(4 pts) 5. Suppose that 2000 feet of fencing is used to create two adjacent pastures as pictured below. Express the total area of the pastures as a function of the width x. Then stop! I am not asking for the maximum possible area.

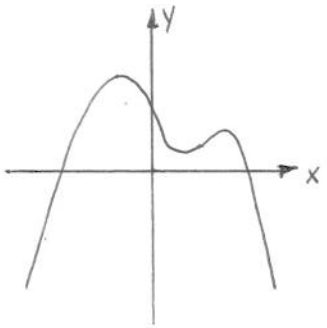


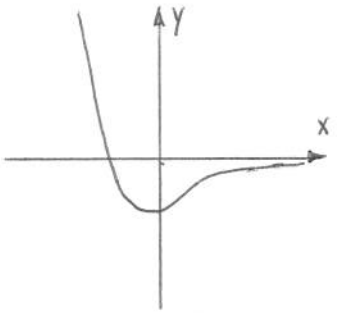
(3 pts) 6. An arrow is shot into the air. Its height above the ground, in feet, after t seconds is given by $h = 200t - 16t^2$. Find the maximum height and the time t at which the arrow reaches that height. Round your answers to one decimal point, and give units.

(4 pts) 7. Determine the point on the curve $y = \sqrt{x}$ that is closest to $(2, 0)$.

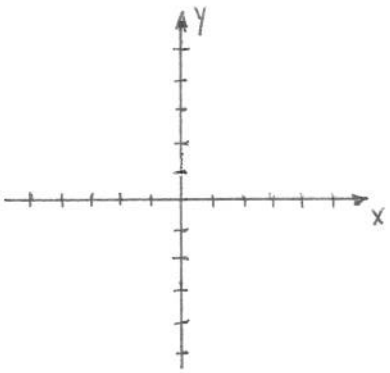


(2 pts) 8. Determine whether the graph can represent a polynomial of degree four. Just say yes or no; no explanation necessary.



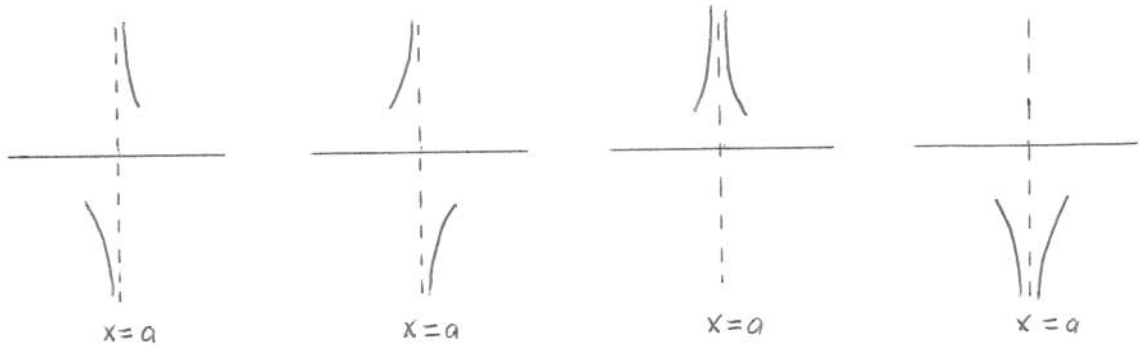


(4 pts) 9. Sketch the graph $y = (x-4)^3 - 2$, and determine the exact x- and y-intercepts.



(4 pts) 10. (a) Determine the horizontal and vertical asymptotes of the graph $y = \dfrac{10x - 1}{5x + 1}$.

(b) Which one of the following does the graph look like near its vertical asymptote?



(3 pts) 11. Give a possible formula for the function. For (a), give your answer as a polynomial in factored form. For (b), give a rational function with both numerator and denominator in factored form.