

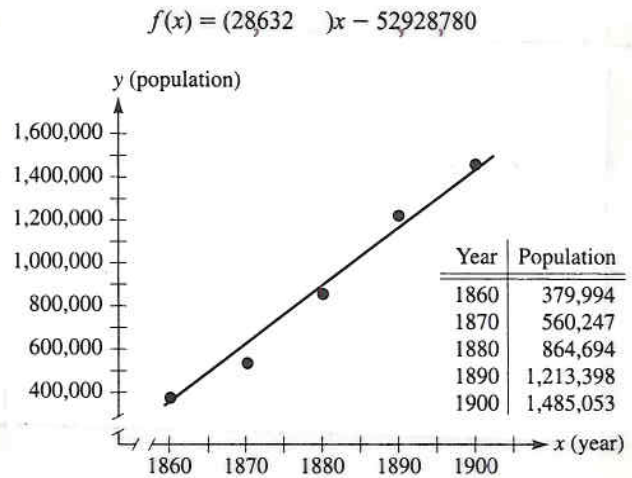
College Algebra, Math 143, Kriloff
Exam 2, Fall 2002

Instructions: Show your work! If you use a calculator, write what you computed or sketch the graph you used. Include intermediate steps. Multiple answers or a correct answer without a reasonable amount of work might receive no credit. Give exact answers unless asked for decimal approximations. When finished, check your work by hand or on your calculator.

1. (6 points) Find the linear function such that $f(2) = 3$ and $f(8) = 0$.

2. (8 points) Data and a regression line for the population of California in year x are shown.

(a) Use the equation of the regression line to estimate the population of California in 1950.



(b) Consider the estimate in part (a) and a similar estimate for 1885. Which is more accurate and why? (Do not actually compute the second estimate.)

3. (8 points) Complete the square for $f(x) = \frac{1}{2}x^2 + 9x + \frac{51}{2}$.

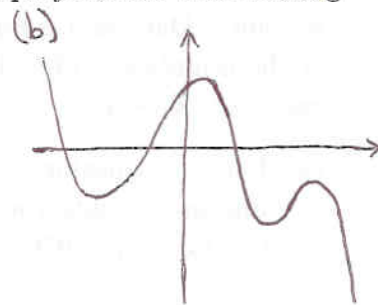
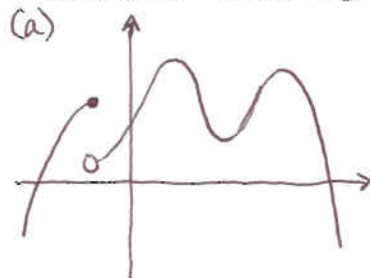
4. (10 points) If $f(x) = 2(x - \pi)^2 - \frac{4}{7}$, find the following.

(a) The exact coordinates of the vertex.

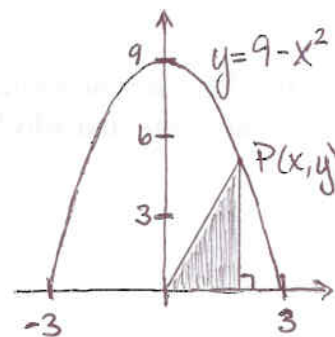
(b) The exact y -intercept.

(c) The exact x -intercept(s) if any.

5. (6 points) Give a reason why each graph cannot represent a polynomial with leading coefficient -7 and degree 4.



6. (8 points) Point $P(x, y)$ is on the curve $y = 9 - x^2$. Express the perimeter of the triangle as a function of x . Do not simplify.



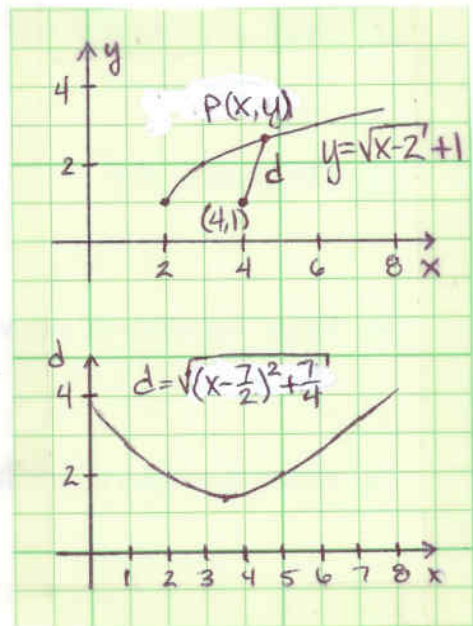
7. (6 points) A Norman window has the shape of a semicircle on top of a rectangle, as shown. If the semicircle has radius r and the rectangle has height h , express the area of the window in terms of r and h .



8. (10 points) Find the maximum product of two numbers such that the sum of the first number and 2 times the second number is 10.

9. (6 points) The distance d , shown below, from a point P on the graph $y = \sqrt{x-2} + 1$ to the point $(4, 1)$ is given by $d = f(x) = \sqrt{x^2 - 7x + 14} = \sqrt{\left(x - \frac{7}{2}\right)^2 + \frac{7}{4}}$. The second figure below gives the graph of $d = f(x)$.

(a) Find the minimum value of d .



(b) Find the point on $y = \sqrt{x-2} + 1$ closest to $(4, 1)$.

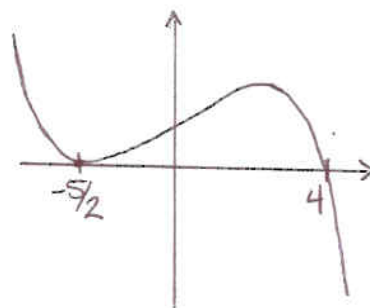
10. (10 points) Which of the following are polynomials? For those that are, give the degree; for those that are not, explain clearly why not using the definition of a polynomial.

(a) $g(x) = -3x^4(4x^2 + 5x)(x - 1)^3$

(b) $h(x) = 2x^2 - 5\sqrt{3x} + \pi x^{-6}$

(c) $k(x) = \frac{-\sqrt{7}x + x^4 + 10}{3}$

11. (6 points) Give a possible formula for a polynomial with the given graph.



12. (10 points) $f(x) = \frac{x^2 + x - 6}{4x^2 - x}$. Find the following by hand or state none. Show work!

(a) Exact x -intercepts, if any.

(b) Exact y -intercept, if any.

(c) The domain of f .

(d) Exact equations of any vertical asymptotes.

(e) Exact equations of any horizontal asymptotes.

13. (6 points) Sketch a graph of a rational function $y = f(x)$ with the following properties.

x -intercepts: -6 and 0

vertical asymptotes: $x = -4$, $x = -1$

as $|x| \rightarrow \infty$, $y \rightarrow 2$

range: $(-\infty, 2) \cup [5, \infty)$

