

Practice Midterm 2 Spring 2008:

Covers Sections 2.3, 3.1, 3.2, 10.1, 10.2, 10.3, 10.4. For further practice please see “Practice problems for the final” available at:

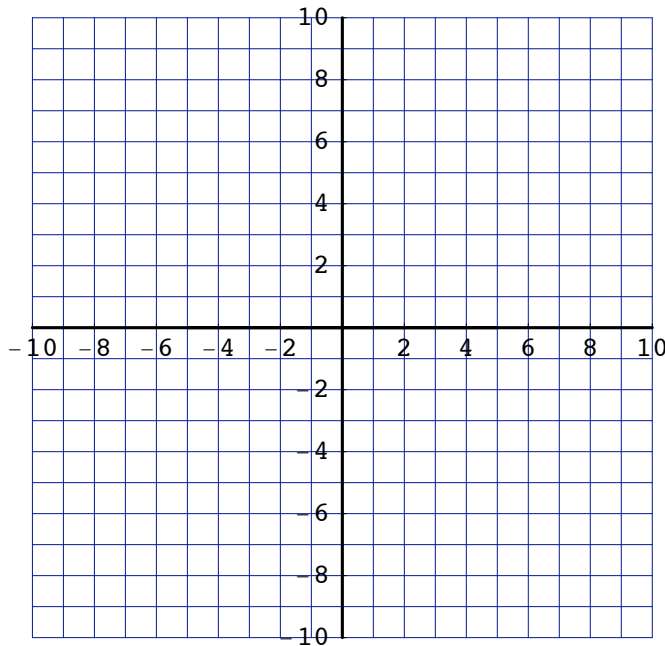
<http://www.csun.edu/kfs4816/103/Schedule.html>.

Look at the problems in “Practice problems for the final” from sections: 5, 8, 10 and 12.

1. Let $f(x)$ be the quadratic function:

$$f(x) = 2x^2 - 8x + 2.$$

- (a) By completing the square, write $f(x)$ in the vertex-form.
- (b) What is the vertex of the parabola?
- (c) What is the maximum or minimum value of the function?
- (d) What is the range of the function?
- (e) What is the y -intercept?
- (f) Does the parabola have one, two, or no x -intercepts?
- (g) Graph this function including all intercepts and asymptotes.

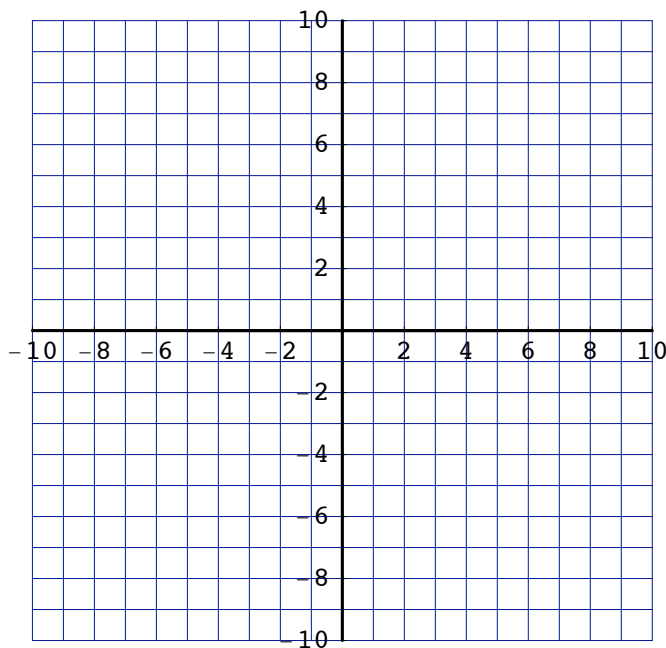


2. Suppose we have \$300 to be invested.

- (a) What amount will our account have after 7 years if it is invested at an annual rate of 3 % compounded daily.
- (b) How long will it take for our account to grow to \$1000 if it is invested at an annual rate of 3 % compounded continuously.

3. Let $f(x) = \frac{3x-1}{2x+4}$

(a) Graph this function including all intercepts and asymptotes.

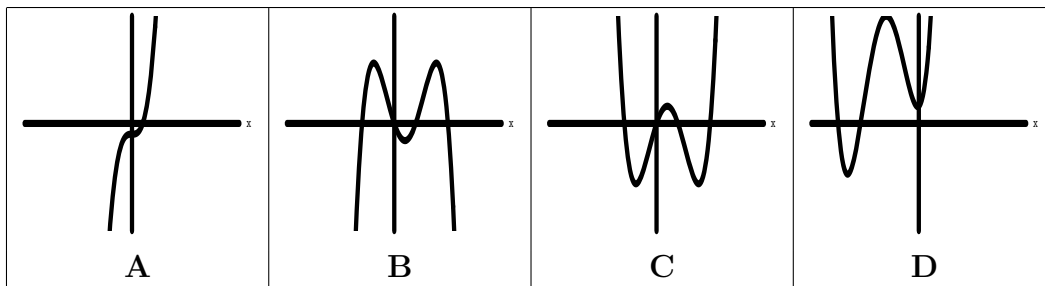


- (b) What is the range of $f(x)$?
- (c) What is the domain of $f(x)$?
- (d) Find $\lim_{x \rightarrow -2^+} f(x)$.
- (e) Find $\lim_{x \rightarrow -2^-} f(x)$.
- (f) Find $\lim_{x \rightarrow 6} f(x)$.
- (g) Find $\lim_{x \rightarrow \infty} f(x)$.
- (h) Prove that $y = \frac{3}{2}$ is not in the range of $f(x)$.

4. Consider the polynomial function

$$f(x) = 2x^4 - 3x^2 + 4x - 7.$$

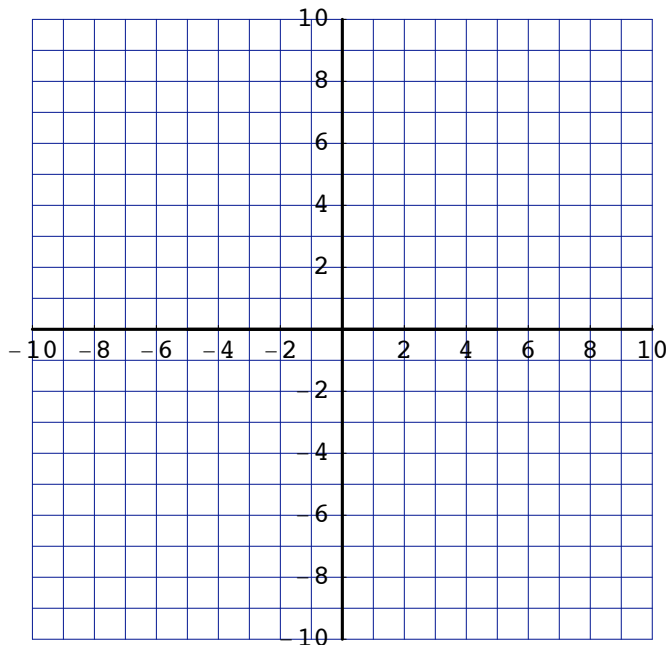
- (a) What is the degree of this polynomial?
 - (b) What is the maximum number of times this polynomial can intersect the x -axis?
 - (c) What is the maximum number of turning points this polynomial can have?
5. Let $f(x) = ax^4 + bx^3 + cx^2 + dx + e$ be a polynomial function of degree 4, where a is positive and the function has four x -intercepts. Which one of the graphs below could be the graph of $y = f(x)$? Why?



6. Consider the following function.

$$f(x) = \begin{cases} 2x - 1, & \text{if } x \leq 2 \\ 3, & \text{if } 2 < x < 4 \\ -x + 9, & \text{if } x \geq 4 \end{cases}$$

(a) On the axes below graph $y = f(x)$.



- (b) Using the graph and the function find $\lim_{x \rightarrow 2^+} f(x)$.
- (c) Using the graph and the function find $\lim_{x \rightarrow 2^-} f(x)$.
- (d) Find $f(2)$.
- (e) Using the graph and the function find $\lim_{x \rightarrow 4^+} f(x)$.
- (f) Using the graph and the function find $\lim_{x \rightarrow 4^-} f(x)$.
- (g) Find $f(4)$.
- (h) Where is this function continuous?
- (i) Where is this function differentiable?

7. Consider the revenue function $R(x) = 250x - x^2$ for producing x widgets.
- (a) Sum Find the change in revenue when production changes from $x = 10$ to $x = 20$.
 - (b) Sum Find the average rate of change of revenue for this change in productions levels.
 - (c) Sum Use this to estimate the revenue at a production of $x = 21$.
8. The revenue from the sale of x cellphone towers is given by

$$R(x) = 1000x - 10x^2.$$

The derivative of the revenue function is given by $R'(x) = 1000 - 20x$.

- (a) Sum What is the change in revenue if production is changed from $x = 5$ to $x = 6$ cellphone towers?
- (b) What is the (instantaneous) rate of change in revenue at $x = 5$?