

## Math&141 - Final Exam Review

Most of these problems are from previous quarters' exams. Keep in mind that it does not cover every possible type of question that could appear on your exam.

- Find the equation of the circle with center  $(-2, 0)$  which passes through the point  $(6, 6)$ .
- Let  $f(x) = 3x^2 - 12x + 1$ .
  - What is the average rate of change of  $f(x)$  from  $x = 1$  to  $x = 4$ ?
  - Find  $\frac{f(a+h)-f(a)}{h}$ .
  - What is the minimum value of  $f(x)$ ?
- Write the function  $g(x)$  whose graph starts as the graph of  $f(x) = |x|$ , then is shifted 2 units to the left, reflected over the x-axis, and shifted 3 units down.
- Let  $f(x) = x^3 - 2x$  and  $g(x) = 3x$ . Find:
  - $(f + g)(1)$
  - $(f - g)(x)$
  - $(fg)(x)$
  - $(g \circ f)(2)$
  - $(f \circ g)(2)$
- Find functions  $f(x)$  and  $g(x)$  to express the function  $h(x) = \sqrt{x^3 - 2}$  as a composition  $(f \circ g)(x)$ . (There is more than one correct answer.)
- Find the inverse functions for the following functions:
  - $f(x) = 3x^5 + 2$
  - $g(x) = 2e^x$
- Divide, *using synthetic division*, and express your answer in the form  $Q(x) + \frac{R(x)}{D(x)}$ :  
 $3x^3 - x + 20 \div x + 2$ .
- Sketch the graph of the rational expression  $\frac{x+4}{x^2-4x-12}$ . Include all intercepts and asymptotes.
- Find the value of the following expression, rounded to 4 decimal places:  $\log_6 20$  (Even though you'll need your calculator, don't forget to write down your work.)
- Suppose a radioactive element has a half-life of 20 days. Give a formula  $m(t)$  which gives the remaining mass of a 100 mg sample after  $t$  days.
- You invest \$800 in an account at an interest rate of 5%, compounded *continuously*.
  - How much money will be in the account in 3 years?
  - How long will it take for the investment to double?
- Solve: (a)  $6^{x+2} - 4 = 20$  (b)  $3 \log(x - 2) = 6$

Also, be comfortable analyzing graphs. See the following problems from the book: p. 179 #15; p. 234 #3