Math 206 Exam Prep-Fall 2018

Student Success Center

Concordia University

1. Simplify the expression below. Do not use a calculator.
   a) $-\sqrt{18}+2\sqrt{8}+\sqrt{72}$
   b) $\frac{2}{4}\ln 16+\ln(7^2-1)$
2. Rationalize the denominator in each expression:
   a) $\frac{\sqrt{5}}{3-\sqrt{2}}$
   b) $\frac{1-\sqrt{2}}{1+\sqrt{2}}$
3. Simplify the expressions:
   a) $6x(x^3-x^2-3x)-4x(3x^4-2x^3+3x^2+x)$
   b) $\frac{x^2-3x-10}{x^3-8}$
4. Factor the polynomial completely:
   a) $3x^2-10x+8$
   b) $8x^3+27$
5. Perform the arithmetic operation and simplify:
$$\frac{x}{x-3}-\frac{x+1}{x^2+5x-24}$$
6. Solve the equations:
   a) $\frac{4(x-2)}{x-3}+\frac{3}{x}=\frac{-3}{x(x-3)}$
   b) $\log_3(x+1)+\log_3(x+4)=2$
   c) $3(3^x)=243$
7. Solve the inequalities, express your answer using set notation or interval notation:
   a) $\frac{1}{2}\leq\frac{x+1}{3}<\frac{3}{4}$
   b) $|1-2x|-4<-1$
8. Solve the system of equations:
$$x^2-y^2=21$$
$$x+y=7$$
9. a) Which points $A(5,2)$, $B(8,3)$ is closer to the point $C(10,4)$?
   b) Show that the equation $2x^2+2y^2-2x+4y+2=0$ represents a circle. Find coordinates of the center and radius of the circle.
10. Find the domain and range of the function (do not graph):
    a) $f(x)=\frac{3x}{x^2-4}$
    b) $g(x)=\sqrt{2-x}$
    c) $h(x)=|x|-4$
11. Sketch the graph of the function $f(x)=\frac{1}{2}\ln(x+3)$, starting from the graph pf the function $g(x)=\ln x$ and using approximate transformations.

12. Let $f(x) = \frac{x}{x+3}$ and $g(x) = \frac{2}{x}$. Find (a) fg, (b) $\frac{f}{g}$, (c) $f \circ g$, (d) $g \circ f$.
13. a) Find the inverse of the function $f(x) = \frac{2x+3}{x+2}$.
    b) Find the vertical and horizontal asymptotes of both f and f^{-1} above.
14. Mary invests \$15, 000, some in stocks and the rest in bonds. If she invests twice as much in stocks as she does in bonds, how much does she invests in each?
15. A rectangular area that is numerically twice its perimeter. If the length is twice the width, what are its dimensions?
16. A student sick with a flu virus returns to an isolated college campus of 2000 students. The number of students affected with flu t days after the student's return is predicted by the logistic function

$$P(t) = \frac{2000}{1 + 1999e^{-0.8905t}}$$

    a) How many students will be infected with the flu after 5 days?
    b) How long will it take for one-half of the student population to become infected?
    c) How many students does the model predict to be infected after a very long period of time?