

Mathematics 131 – Calculus for Physical and Life Sciences 1
Precalculus Review Problems
September 1, 2004

The following problems will not be collected or graded. They are similar to questions on the first diagnostic quiz to be given in class on Tuesday, September 7.

1. Find all values of x that satisfy the given inequality or inequalities:

- a) $-4x \geq 20$
- b) $x + 1 > 4$, or $x + 2 < -1$
- c) $x + 3 > 1$ and $x - 2 < 1$

2.

- a) Rewrite using positive exponents only: $\frac{x^{-1/3}}{x^{1/2}}$
- b) Simplify: $(x^2y^{-3})(x^{-5}y^3)$
- c) Simplify: $\left(\frac{x^{-3}}{y^{-2}}\right)^2 \left(\frac{y}{x}\right)^4$

3. A salesperson's monthly commission is 15% on all sales over \$12000. If the goal is to make a commission of at least \$3000 per month, what should his/her monthly sales be?

4. Factor:

- a) $7a^4 - 42a^2b^2 + 49a^3b$
- b) $xe^{-2x} - x^3e^{-x}$
- c) $6ac + 3bc - 4ad - 2bd$
- d) $3x^2 - 6x - 24$
- e) $9x^2 - 16y^4$

5. Solve for x :

- a) $x^2 + x - 12 = 0$
- b) $4x^3 + 2x^2 - 2x = 0$
- c) $8x^2 - 8x - 3 = 0$

6. Simplify:

a)

$$\frac{2a^2 - 2b^2}{b - a} \cdot \frac{4a + 4b}{a^2 + 2ab + b^2}$$

b)

$$\frac{58}{3(3 + t^2)} + \frac{1}{3}$$

c)

$$\frac{2x}{2x-1} - \frac{3x}{2x+5}$$

d)

$$\frac{1 + \frac{1}{x}}{1 - \frac{1}{x^2}}$$

e)

$$\frac{2x(x+1)^{-1/2} - (x+1)^{1/2}}{x^2}$$

7. Let $f(x) = (x+1)^3$ and $g(x) = x^2 - 1$.

a) What is the function $f(g(x))$?

b) What is the function $g(f(x))$?

c) What is the function $f(x)g(x)$?

d) What is the domain of the function $\frac{f(x)}{g(x)}$?

8.

a) Let $f(x) = x^3 - 2x^2 + 3$. Simplify as far as possible: $\frac{f(a+h)-f(a)}{h}$.

b) Same question for $f(x) = \frac{1}{\sqrt{x}}$.

9. Express in terms of the sine and cosine functions and simplify:

$$g(x) = \csc^2(x) + \sec^2(x)$$