

Mathematics 135 – Calculus 1
Answers for Precalculus Review Problems
August 28, 2013

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:

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