Problem set 34

1. The pressure of an ideal gas varies directly as the temperature and inversely as the volume. If the initial pressure, volume, and temperature were N newtons per square meter, L liters, and $K°$ kelvin, what would the pressure be if the volume were 4 liters and the temperature were 1000° kelvin?
2. Write the key identities for practice, and then develop identities for $\tan (A + B)$ and $\tan (A - B)$.
3. Use the sum identity for the tangent function to find the exact value of tan 75°. [*Hint*: $\tan 75° = \tan (45° + 30°)$.]
4. Find the surface area of a sphere whose volume is $\frac{4}{3}\pi$ cubic meters.
5. Find the volume of a right circular cone whose base has an area of 4π square centimeters and whose height is 4 centimeters.
6. Find the volume of a trough 5 meters long whose ends are equilateral triangles, each of whose sides has a length of 2 meters.

Use the power rule of differentiation to differentiate.

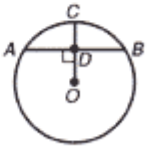
7. Find $\frac{dy}{dx}$ if $y = \frac{1}{x^3}$.
8. Find $f'(x)$ if $f(x) = \sqrt{x^3}$.
9. Find $\frac{ds}{dt}$ if $s(t) = \frac{1}{\sqrt{t}}$.
10. Find $D_x y$ if $y = x^{14}$.
11. Express the four fourth roots of $\frac{1}{2} - \frac{\sqrt{3}}{2}i$ in polar form.
12. Find all values of x which lie between 0 and 2π which satisfy the equation $\cos 3x = \frac{1}{2}$.
13. The general equation of a conic section is $x^2 + y^2 - 2x + 4y - 4 = 0$. Write this equation in standard form and fully describe the conic section.
14. Find all integer values of x which satisfy the inequality $|x - 2| > -1$.
15. Find the coefficient of x^3y^2 in the expansion of $(x - 2y)^5$.
16. If $f(x) = \sqrt{x}$ and $g(x) = f(x + 2) + 2$, graph both f and g on the same coordinate plane.

Evaluate the following limits:

17. $\lim_{x \to 1} \frac{x^2 - 1}{x^2 + 2x - 3}$
18. $\lim_{n \to \infty} \frac{(n + 1)(n - 3)}{2 - n^2}$
19. Graph $f(x) = [x]$ and evaluate $f(1.2)$, $f(-1.5)$, and $f(-2\frac{1}{2})$.
20. Find the distance between the point (2, 3) and the line $5y = 12x + 4$.

CONCEPT REVIEW

21. Find the radius of the circle if $AB = 8$ and $OD = 3$.



22. Find the sum of all the terms of the geometric sequence $\{1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots\}$.