Review Sheet for Calculus III

On Friday there will be a quiz covering arithmtic, algebra, geometry, trigonometry and of course basic calculus. The quiz will count as a homework set. I will ask to meet individually with students who score poorly. Below are some practice problems. But these are not the quiz questions. If a problem is difficult for you, it means you need to review that topic area.

NO CALCULATORS

(1) Compute: (a) 23.56×7.12. (b) $\frac{17}{34} - \frac{14}{15}$ (c) $\log_4 32$ (d) 200% of 87.

(2) Simplify: (a) $\frac{2x+y}{x-y} + \frac{4x+y}{x+y}$ (b) $1024 \frac{p^8 w^2}{y^6 x^2} v^{1/3} \left(\frac{x^2 p^{-4} 4^2 v^{1/3}}{x y^{-3} 8^3 p w} \right)^2$

(3) A tetrahedron has edge length of 1 meter. Find its volume and surface area. Generalize.

(4) A triangle has edge lengths 3, 7 & 8. Find all the angles in radians.

(5) Compute $\sec^{-1} \sqrt{2}$ in radians.

(6) Graph: (a) $y = 3\cos(2x + \pi)$ (b) $y = e^{-x^2} \cos(x)$ (c) $y = (x+2)(x-5)|x-1|$ (d) $y = \sin(x)/x$ (e) $y = \sin(1/x)$.

(7) (a) If $f(x)$ is an odd function and $g(x)$ is an even function what can you say about $f(f(g(g(f(x)))))$? (b) Can you give an example of a function that is both odd and even?

(8) Prove that $(f(x) + g(x))' = f'(x) + g'(x)$, where f and g are real valued differentiable functions of a real variable.

(9) Compute: $\lim_{x \to -2} \frac{x^2 + 5x + 6}{x + 2}$, with and without using L'Hopital's Rule.

(10) Compute: $\lim_{x\to\infty} \dfrac{x^2+\sin x}{x^2}$.

(11) Let $f(x,y) = \sin(yx^2)\dfrac{yx+\ln x}{yx\tan 3x}$. Assume x and y are independent variables. First compute the derivative of f with respect to x. Then compute the derivative of f with respect to y.

(12) $\displaystyle\int_{-15}^{15} \sin x^3\,dx$

(13) $\displaystyle\int x\cos 4x\,dx$

(14) $\displaystyle\int \sin 2\alpha\cos 7\alpha\,d\alpha$

(15) $\displaystyle\int \arctan 3P\,dP$

(16) $\displaystyle\int xe^x + xe^{x^2}\,dx$

(17) $\displaystyle\int \frac{x}{\sqrt{9-x^2}}\,dx$

(18) Consider the region formed from rotating the portion of the parabola give by $y = 4 - x^2$ for $y \geq 0$ about the y-axis. Find its volume and surface area not including the base.

(19) Derive the formula for the volume of a sphere as a function of its radius R. Take its derivative. What does this give you?

(e) Why is e important? Give the value of e to five decimal places. Find an infinite series that converges to e.