Consider the expression $(9x^8 - 7x^5)^{27}$. SCORE: / 25 PTS

[a] Write the first 3 terms of the expansion of the expression. Simplify all exponents.

Your answer may use multiplication and exponents, but NOT division, ! nor
$${}_{n}C_{r}$$
 (or equivalent) notation.

$$9^{27} \times {}^{216} - 27 \cdot 9^{26} \cdot 7 \times {}^{213} + \frac{27 \cdot 26}{2} \cdot 9^{25} \cdot 7^2 \times {}^{210}$$
 (1) POINT EXCEP

$$= q^{27} \times {}^{216} - 27 \cdot q^{26} \cdot 7 \times {}^{213} + \frac{27 \cdot 26}{2} q^{25} 7^{2} \times {}^{210}$$

$$= q^{27} \times {}^{216} - 27 \cdot q^{26} \cdot 7 \times {}^{213} + \frac{27 \cdot 26}{2} q^{25} - 2 \times {}^{210}$$

[b]

Find the coefficient of
$$x^{93}$$
 in the expansion.

Your answer may use multiplication, division, exponents and !, but NOT "C, (or equivalent) notation.

$$\begin{pmatrix}
27 \\
(9 \times 8)^{27} \\
(-7 \times 5)^{5}
\end{pmatrix}$$

$$= \frac{27!}{r!(27-n)!} = \frac{27-r}{r!(27-n)!} = \frac{27-r}{r!(27-n)!} = \frac{27!}{r!(27-n)!} = \frac{27-r}{r!(27-n)!} =$$

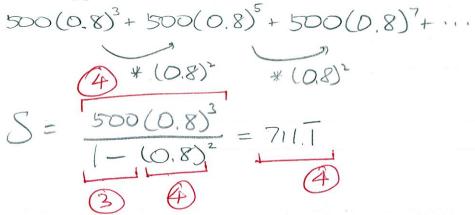
$$= \frac{27!}{r!(27-r)!} = \frac{$$

Simplify
$$\frac{(3n-2)!}{(3n+1)!}$$
.

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$$\frac{(3n-2)!}{(3n+1)(3n)!} = \frac{1}{3n(3n+1)(3n-1)}$$

Find the value of $\sum_{n=2}^{\infty} 500(0.8)^{2n-1}$. HINT: Write out the first few terms first.



n = 16

(-2) IF INDEX DOESN'T MATCH INSIDE OF SUMMATION Eliminate the parameter to find a rectangular equation corresponding to the parametric equations $x = 4 + 5 \sec t$ $y = 3 + 7 \tan t$

 $v = 3 + 7 \tan t$ SCORE: _____/15 PTS

For your final answer, write y as a <u>simplified</u> function of x.

$$sect = \frac{x-4}{5}, 4$$

$$tant = \frac{y-3}{7}, 4$$

$$sec^{2}t - tan^{2}t = 1$$

$$(\frac{x-4}{5})^{2} - (\frac{y-3}{7})^{2} = 1, 6$$

For the month of October 2013, MJ's and NJ's water bills were each \$23. Over the next two years, MJ's monthly SCORE: _____/20 PTS bill has increased 25 cents each month, while NJ's monthly bill has increased 1% each month. Whose total water bills over the last two years has been higher, and by how much?

MJ:
$$S_{24} = \frac{24}{2}(2(23) + (0.25)(24-1)) = 621$$

NJ: $S_{24} = \frac{23}{23}(1.01^{24}-1) = 620.39$

A cat jumps from a window of a building, at an angle of 53.13° above the horizontal,

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with an initial speed of 7.5 feet per second, and lands safely on the ground 9 feet away from the base of the building. Let h be the height of the window above ground level.

NOTE: $\sin 53.13^{\circ} = \frac{4}{5}$ and $\cos 53.13^{\circ} = \frac{3}{5}$

Write parametric equations for the cat's position. [a]

$$X = (7.5 \cos 53.13^{\circ})t = 4.5t.4$$

 $Y = h + (7.5 \sin 53.13^{\circ})t - 16t^{\circ} = h + 6t - 16t^{\circ}.4$

How high off the ground is the window? [b]

$$x = 4.5t = 9.3$$

$$J = h + 6(2) - 16(2) = 0$$
, GROUND LES
$$h = 52, FEET = 2$$

Using mathematical induction, prove that
$$2^3 + 4^3 + \cdots + (2n)^3 = 2n^2(n+1)^2$$
 for all positive integers n . SCORE: _____/25 PTS

BAS 13 STEP: $2^3 = 8$, $2 = 2(1)^2(1+1)^2 = 2(1)(4) = 8$, $2 = 2(1)^2(1+1)^2 = 2(1)(1$

$$3 = \frac{2k^{2}(k+1)^{2} + (2(k+1))^{3}}{2(k+1)^{2}[k^{2} + 4(k+1)]}$$

$$= \frac{2(k+1)^{2}[k^{2} + 4(k+1)]}{2(k+1)^{2}(k+2)^{3}}$$

$$3 = \frac{2(k+1)^{2}(k+2)^{3}}{2(k+1)^{2}(k+2)^{3}}$$

$$3 = \frac{2(k+1)^{2}(k+2)^{3}}{2(k+1)^{2}(k+2)^{3}}$$