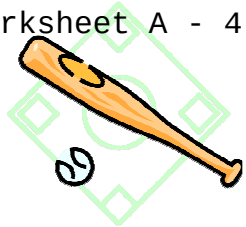
1ST TRY… 3 POINTS
2ND TRY… 2 POINTS
3RD TRY… High five!

3 Strikes Yer Out!

Worksheet A - 4.5



Group Members:

KEY

1. Find the linearization of $f(x)=\frac{4}{x^4}-2x$ at x = -1.

$f'(x) = \frac{-16}{x^5} - 2$

$f'(-1) = \frac{-16}{-1} - 2 = 14$

$f(-1) = 4+2 = 6$

$y-6 = 14(x+1)$

$L(x) = 14(x+1)+6$

$\boxed{L(x) = 14x+20}$

---

2. Use the linearization in #1 to estimate f(-0.99).

$L(-0.99) = 14(-0.99+1)+6 = .14+6 = \boxed{6.14}$

---

3. Find the exact value of f(-0.99) and then find the approximation error.

$f(-0.99) = 6.144081423$

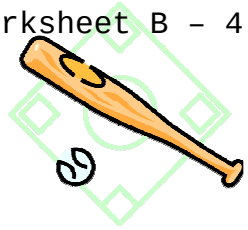
Error $\approx .00408$

Error is less than 10^{-2}.

1ST TRY… 3 POINTS
2ND TRY… 2 POINTS
3RD TRY… High five!

3 Strikes Yer Out!

Worksheet B – 4.5



Group Members:

KEY

1. Find dy if $y = \frac{7}{2}x^2 - 3x + 1$, x = 4, dx = .03

$\frac{dy}{dx} = 7x - 3$

$dy = (7x-3)\,dx$

$dy = (7\cdot 4 - 3)(.03) = 25\cdot(.03) = \boxed{.75}$

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2. Given the function: $f(x) = \frac{x-4}{x+2}$, x = 1, dx = .02. Find the:

a) true change

$f(1.02) - f(1) = -.9867549669 + 1 \approx \boxed{.013245}$

b) estimated change

$\frac{df}{dx} = \frac{(x+2)(1) - (x-4)(1)}{(x+2)^2} = \frac{6}{(x+2)^2}$ $\quad df = \frac{6}{9}(.02) = \boxed{.01\overline{3}}$

c) approximation error

8.83×10^{-5} Error is less than 10^{-4}.

---

3. How accurately should you measure the radius of a sphere so that the surface area is within 5% of its true value?

$dA = .05A$ $\quad dr = ?$

$A = 4\pi r^2$

$\frac{dA}{dr} = 8\pi r$

$dA = 8\pi r\,dr$

$.05A = 8\pi r\,dr$

$\frac{.05 \cdot 4\pi r^2}{8\pi r} = \frac{8\pi r\,dr}{8\pi r}$

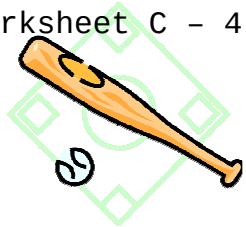
$.025r = dr$

The radius should be measured to within 2.5% of its true value.

1ST TRY… 3 POINTS
2ND TRY… 2 POINTS
3RD TRY… High five!

3 Strikes Yer Out!

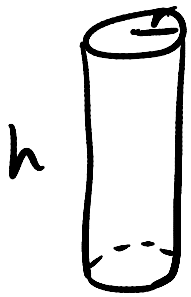
Worksheet C – 4.6



Group Members:

KEY

A slinky, which is essentially a cylinder, is being stretched apart. The length of the slinky is stretching at a rate of 4 cm per second, and the volume of the slinky stays constant. At what rate is the radius of the slinky shrinking when the radius is 3 cm and the length is 10 cm?



$\frac{dh}{dt} = 4$ V is constant!

$\frac{dr}{dt} = ?$ $r = 3$ $h = 10$

$V = \pi r^2 h$

$0 = \pi r^2 \frac{dh}{dt} + 2\pi r h \frac{dr}{dt}$

$0 = \pi (3)^2 (4) + 2\pi (3)(10) \frac{dr}{dt}$

$0 = 36\pi + 60\pi \frac{dr}{dt}$

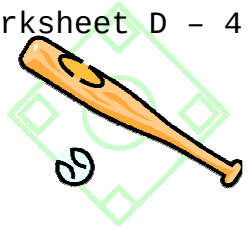
$-36\pi = 60\pi \frac{dr}{dt}$

$\frac{dr}{dt} = \boxed{-.6 \text{ cm/sec.}}$

1ST TRY… 3 POINTS
2ND TRY… 2 POINTS
3RD TRY… High five!

3 Strikes Yer Out!

Worksheet D – 4.6



Group Members:

KEY

Mike is at a birthday party and decides it would be funny to suck the helium out of a spherical balloon. If Mike can suck the helium out of the balloon at a rate of 4 cubic inches per second, at what rate will the radius be shrinking when the radius is 2 inches?

$\frac{dV}{dt} = -4 \qquad \frac{dr}{dt} = ? \qquad r = 2$

$V = \frac{4}{3}\pi r^3$

$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$

$-4 = 4\pi (2)^2 \cdot \frac{dr}{dt}$

$-4 = 16\pi \frac{dr}{dt}$

$\frac{dr}{dt} = -\frac{1}{4\pi} \approx \boxed{-.080 \text{ in/sec.}}$

Names:

_____

_____

_____

_____

Worksheet	1st Attempt – 3 points	2nd Attempt – 2 points	3rd Attempt – HIGH FIVE!
A			
B			
C			
D			
Total Points			

3 Strikes Yer Out Rules

1) Each worksheet has 1-3 problems. After you are done, bring up the one you finished for grading.

2) You must ***work together*** so that each group member is at the same pace.

Note: Hitchhiking is illegal in Calculus!!

3) When your **whole group** is finished with the worksheet, one person should bring ***ALL*** worksheets to check with me. Bring your ***score sheet*** with you!!

4) Scoring:

- If your group gets ***ALL*** problems correct the first time, you will receive 3 points (to be written on the score sheet).

- Otherwise, you will have to take your sheet, go back, and correct them….on the second time, you will receive 2 points.

- ….on the third time…it's a HIGH FIVE FOR YOU!!

Good Luck!!