HW 1 – Pages 4 - 6 – Linearization

1.	If $f(x)=x^3+3x$, approximate $f(2.01)$ using linearization.
2.	For the function *f*, $f'=2x+1$ and $f(1)=4$. What is the approximation for $f(1.2)$ using the tangent line approximation?
3.	Approximate $\sqrt{24.9}+(24.9)^2$ using linearization.
4.	Find an approximate value for $f(-3.9)$ on $f(x)=\sqrt{x^2+9}$ using linearization.
5.	Approximate using tangent line approximation: $\sqrt[4]{17}$
6.	Approximate using a tangent line approximation $(8.4)^{4/3}$.
7	Let *f* be the function given by $f(x)=\dfrac{2x-5}{x^2-4}$. a. Find the domain of *f*. b. Write an equation for each vertical and each horizontal asymptote for the graph of *f*. c. Find $f'(x)$ and simplify. d. Write an equation for the line tangent to *f* at the point $(0, f(0))$. e. Evaluate $\lim\limits_{x\to 2^+} f(x)$. ("DNE" is not an acceptable answer for this one.)
8.	If $f(x)=\dfrac{1}{x^2+1}$ and $g(x)=\sqrt{x}$, then the derivative of $f(g(x))$ is ... A) $-\dfrac{\sqrt{x}}{(x^2+1)^2}$ B) $-(x+1)^{-2}$ C) $-\dfrac{2x}{(x^2+1)^2}$ D) $\dfrac{1}{(x+1)^2}$ E) $\dfrac{1}{2\sqrt{x}(x+1)}$
9.	$\lim\limits_{x\to 2}\dfrac{\sqrt{x^2-2}-\sqrt{-x+4}}{x-2}=$

Trapezoidal Rule - # 1 – 8

1. Given the definite integral $\int_0^8 x^2\,dx$,
   a) use the Trapezoidal Rule with four equal subintervals to approximate its value. Do not use your calculator!
   b) is your answer to part (a) an overestimate or an underestimate? Justify your answer.
   c) use your graphing calculator to find the exact value of $\int_0^8 x^2\,dx$. Does your value agree with your answers to parts (a) and (b)?

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2. Given the definite integral $\int_{-1}^{2} \left(20 - x^4\right)dx$,
   a) use the Trapezoidal Rule with three equal subintervals to approximate its value. Do not use your calculator!
   b) is your answer to part (a) an overestimate or an underestimate? Justify your answer.
   c) use your graphing calculator to find the exact value of $\int_{-1}^{2} \left(20 - x^4\right)dx$. Does your value agree with your answers to parts (a) and (b)?

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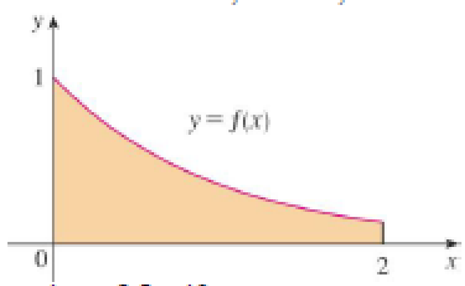
3. The trapezoidal rule and the left and right Riemann sums were used to estimate $\int_0^2 f(x)\,dx$, where f is the function whose graph is shown below. The same number of subintervals were used to produce each approximation. The estimates were 0.7811, 0.8675, and 0.9543.



   a) Which rule produced each estimate? Justify your answer.
   b) Between which two approximations does the exact value of $\int_0^2 f(x)\,dx$ lie? Justify your answer.

4.

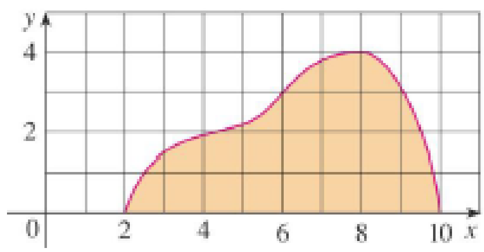
x	-5	-3	0	1	5
$f(x)$	10	7	5	8	11

Given the values for $f(x)$ on the table above, approximate the area under the graph of $f(x)$ from $x = -5$ to $x = 5$ using four subintervals and a Trapezoidal approximation.

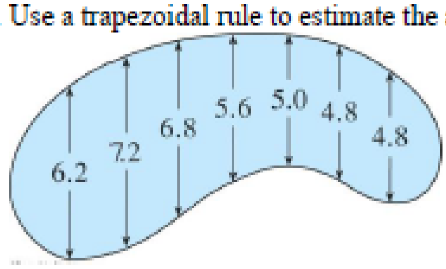
5. A radar gun was used to record the speed of a runner during the first 5 seconds of a race (see table below.) Use the Trapezoidal rule with five equal subintervals to estimate the distance covered by the runner during those 5 seconds.

t (seconds)	0	1	2	3	4	5
v (meters/second)	0	7.34	9.73	10.51	10.76	10.81

6. Estimate the area under the graph in the figure below by using the Trapezoidal rule with eight equal subintervals



7. The widths (in meters) of a kidney-shape swimming pool were measured at 2-meter intervals as indicated in the figure below. Use a trapezoidal rule to estimate the area of the pool.



8. In 1993, Kara Hultgreen became one of the first female pilots authorized to fly navy planes in combat. Assume that as she comes in for a landing on the carrier, her speed in feet per second takes on the values below:

Seconds	**0.0**	**0.6**	**1.2**	**1.8**	**2.4**	**3.0**
Feet/sec	**300**	**230**	**150**	**90**	**40**	**0**

a) Approximate how far her plane travels as it comes to a stop. (Trapezoidal Rule)
b) What are the units for each trapezoidal area?
c) Is her plane in danger of running off the other end of the 800 – ft flight deck? _______ How can you verify your answer?