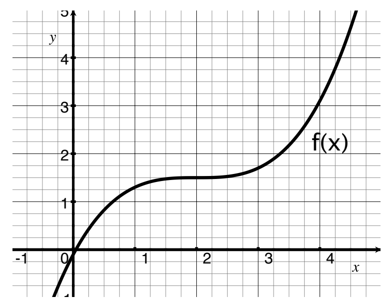
Exam 1 # TMath 126 Spring 2017

1. [12] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true and provide a brief justification. Otherwise, circle F and provide a counterexample or brief justification.

   (a) (Suggested §3.8 #23)) Newton's method will find the root of f (graphed on the right) with a sequence starting at $x = 2$.



   (b) (VectorWks #2) The length of a vector $\overrightarrow{v}$ with components $\langle 1, 3, -2\rangle$ is $\sqrt{2}$.

   (c) If $\lim_{n\to\infty} a_n = 0$, then $\sum_{n=1}^{\infty} a_n$ converges.

   (d) The first degree Taylor polynomial of a function f centered at 2 is the same as the line tangent to f when x=2.

Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

2. Consider: $\left\{ \frac{1}{1}, \frac{-1}{1}, \frac{1}{2}, \frac{-1}{6}, \frac{1}{24}, \frac{-1}{120}, \ldots \right\}$

   (a) [2] Identify the above as a series or a sequence. Explain why.

   (b) [3] (SequenceWks #1) Find a formula for the general a_n term.

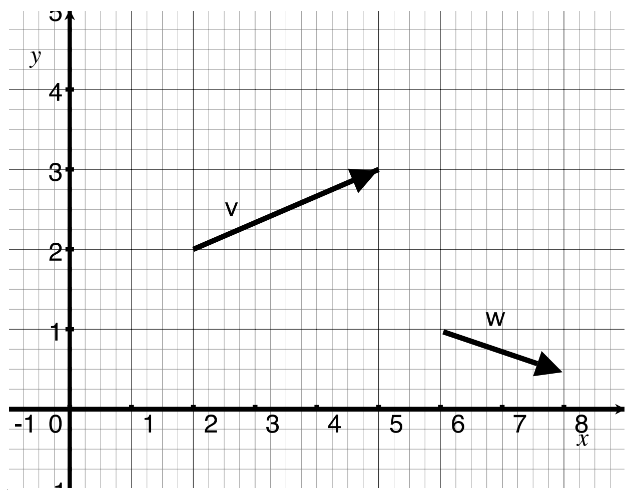
   (c) [3] (Sumer14 Exam1 #2) Determine if the above converges or diverges. Justify your work.

3. Compute the following if possible.

   (a) [4] (WebHW3 #7) $\displaystyle\sum_{n=1}^{\infty} \arctan(\pi n)$.

   (b) [4] (HW1 §9.2 #3) The series $\displaystyle\frac{1}{3} + \sum_{n=1}^{\infty} \frac{1}{3}\left(\frac{2}{3}\right)^n$.

4. Let $\overrightarrow{v}$ and $\overrightarrow{w}$ be shown below.

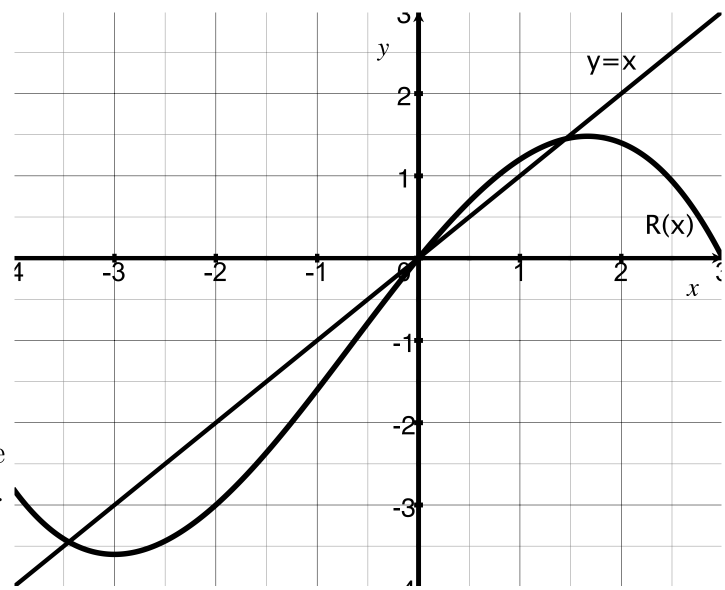


   (a) [2] (Suggested §11.1 #1) Find the components of $\overrightarrow{v}$.

   (b) [1] (Suggested §11.2 #51) Identify the initial point of $\overrightarrow{v}$ shown to the right.

   (c) [2] (VectorWks #2) Sketch the vector $\overrightarrow{v} + \overrightarrow{w}$ on the graph above. Be sure to *label* which vector is $\overrightarrow{v} + \overrightarrow{w}$!

5. (Quiz1 #2) The graph of $R(x)$ and $y = x$ are both graphed to the right. Consider the recursively defined sequence where $a_n = R(a_{n-1})$ and $a_1 = -1.5$.



   (a) [1] (SequenceWks #1) Use the graph to estimate a_2.

   (b) [2] (WrittenHW1§9.1 #3) Use the graph to estimate $\lim_{n\to\infty} a_n$.

6. The temperature of a microprocessor is taken every second and only the last three readings are recorded. Below is a chart of the temperature C (in Celsius) and time t from which we estimated the first and second derivatives of C at $t = 3$.

t	2	3	4
$C(t)$	46	48	52

n	0	1	2
$C^n(3) \approx$	48	4	3

(a) [5] (HW2 §9.7 #1) Use all of the above data to estimate for $C(5)$.

(b) [3] (WebHW5 #1) Temperature changes rather slowly and experimentally we know $C^{(3)}(t)$ has the following graph. Provide an upper bound for the error you found in part (a).