(A): BABCA, DABEA, BD

(B): EABBC, BDCAE, DE

(C): DCCEB, EBADB, AB.

MAC 2312 — Fall 2019 — EXAM 3

Section # _____UFID_____NAME _____
On my honor, I have neither given nor received unauthorized aid doing this exam.

Signature:_____

FR Scores	
1	/7
2	/7
FR Total	/14

SHOW ALL WORK TO RECEIVE FULL CREDIT.

1. (a) Find the Taylor series for $f(x) = \sqrt{x-1}$, centered at 10.

n	$f^{(n)}(x)$	$f^{(n)}(10)$	$C_n = \frac{f^{(n)}(10)}{n!}$
0	$(x-1)^{1/2}$	3	3
+ 1	$\frac{1}{2}(x-1)^{-1/2}$	$\frac{1}{6}$	$\frac{1}{6}$
− 2	$(\frac{1}{2})(-\frac{1}{2})(x-1)^{-3/2}$		
+ 3	$(\frac{1}{2})(-\frac{1}{2})(-\frac{3}{2})(x-1)^{-5/2}$		
− 4	$(\frac{1}{2})(-\frac{1}{2})(-\frac{3}{2})(-\frac{5}{2})(x-1)^{-7/2}$		
⋮	⋮	⋮	⋮
n	$\frac{(-1)^{n+1}}{2^n} \cdot \frac{1\cdot 3\cdots(2n-3)}{(x-1)^{\frac{2n-1}{2}}}$	$\frac{(-1)^{n+1}\, 1\cdot 3\cdots(2n-3)}{2^n \cdot 3^{2n-1}}$	$\frac{(-1)^{n+1}\, 1\cdot 3\cdots(2n-3)}{2^n \cdot 3^{2n-1} \cdot n!}$

$\sum_{n=2}^{\infty}$

for $n \geq$ 2

$$f(x) = \sqrt{x-1} = 3 + \frac{1}{6}(x-10) + \sum_{n=2}^{\infty} \frac{(-1)^{n+1}\, 1\cdot 3\cdots(2n-3)}{2^n \cdot 3^{2n-1} \cdot n!}(x-10)^n$$

(b) Find the second degree Taylor Polynomial $T_2(x)$ centered at 10.

$$T_2(x) = 3 + \frac{1}{6}(x-10) - \frac{1}{2^3 \cdot 3^3}(x-10)^2$$ (no need to combine the terms)

(c) Using $T_2(x)$ to approximate $\sqrt{9.1}$.

$\sqrt{9.1} = \sqrt{x-1} \Rightarrow x = 10.1$

$\sqrt{9.1} \sim T_2(10.1)$

$\sqrt{9.1} \approx T_2(10.1) = 3 + \frac{1}{6}(0.1) - \frac{1}{2^3 \cdot 3^3}(0.1)^2$

$= 3 + \frac{1}{6}(10.1-10) - \frac{1}{2^3 \cdot 3^3}$ 5A $(10.1-10)^2$

OR $= 3 + \frac{1}{60} - \frac{1}{2^3 3^3 \cdot 100}$

2. Let $r = 1 - 2\sin\theta$.

(a) Find the points (r, θ) where the curve intersects the pole (origin), the $x-$, and the $y-$ axis in the interval $0 \le \theta \le 2\pi$.

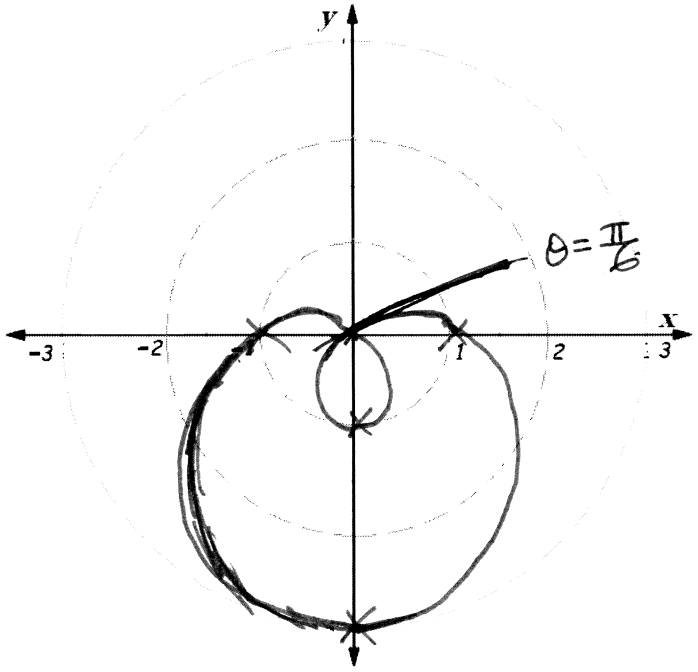
$r = 0 \Rightarrow \sin\theta = \frac{1}{2} \Rightarrow \theta = \frac{\pi}{6}, \frac{5\pi}{6}$.

r intersects the pole at (r, θ) : $(0, \frac{\pi}{6}), (0, \frac{5\pi}{6})$

r intersects the $x-$axis at (r, θ) : $(1, 0), (1, \pi), (1, 2\pi)$

r intersects the $y-$axis at (r, θ) : $(-1, \frac{\pi}{2}), (3, \frac{3\pi}{2})$, [optional : $(0, \frac{\pi}{6}), (0, \frac{5\pi}{6})$]

(b) Sketch the polar curve r.



(c) Set up an integral for the area enclosed by the curve in the first quadrant. **(do not evaluate)**.

$A = \int_0^{\pi/6} \frac{1}{2} r^2 \, d\theta$

$A =$ _____