MATH 166 Section C
July 10, 2013

Quiz #7

Name: Key

Please work alone, and keep your eyes on your own paper. Show *all* work to receive full credit.

1. (10 points) Find the Taylor polynomial of order 3 based at a for the function $f(x) = e^{3x}$ with $a = 4$.

$$P_3(x) = f(4) + f'(4)(x-4) + \frac{f''(4)}{2!}(x-4)^2 + \frac{f'''(4)}{3!}(x-4)^3$$

$f(x) = e^{3x}$ $\quad f(4) = e^{12}$

$f'(x) = 3e^{3x}$ $\quad f'(4) = 3e^{12}$

$f''(x) = 9e^{3x}$ $\quad f''(4) = 9e^{12}$

$f'''(x) = 27e^{3x}$ $\quad f'''(4) = 27e^{12}$

$$P_3(x) = e^{12} + 3e^{12}(x-4) + \frac{9e^{12}}{2}(x-4)^2 + \frac{27e^{12}}{3!}(x-4)^3$$

$$= e^{12}\left[1 + 3(x-4) + \frac{9}{2}(x-4)^2 + \frac{9}{2}(x-4)^3\right]$$

Rubric

+1 each for $f'(x)$, $f''(x)$, $f'''(x)$, $f'(4)$, $f''(4)$, $f'''(4)$

+4 for either version of $P_3(x)$ at the end (one point for each of the 4 terms)

If they got any of f', f'', f''' wrong

Quiz #7

2. (10 points) Obtain the Cartesian equation of each of the following curves by eliminating the parameter.

$$x = 3t,\ y = 2t$$

$x = 3t \Rightarrow t = \frac{x}{3}$

$\Rightarrow y = 2t = 2\left(\frac{x}{3}\right) = \frac{2}{3}x$

$y = \frac{2}{3}x$

Rubric:
+2 solve one equation for t
+1 substitute t into the other equation
+2 final answer (ok if just a string of equalities)

$$x = 2\sin t,\ y = 3\cos t$$

Use the pythagorean identity $\sin^2 t + \cos^2 t = 1$

$\sin t = \frac{x}{2}$ and $\cos t = \frac{y}{3}$

$\left(\frac{x}{2}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$

$\frac{x^2}{4} + \frac{y^2}{9} = 1$

Rubric
+2 solved for both $\sin t$, $\cos t$ correctly
+1 ~~substitute~~ used the right Pythagorean identity.
+2 substituted $\frac{x}{2}$, $\frac{y}{3}$ correctly