Exam 3 Review T/F

1. T/F (with justification)

   If $\sum_{n=0}^{\infty} c_n$ converges then $\sum_{n=0}^{\infty} c_n x^n$ converges when $|x| < 1$.

2. T/F (with justification)

   If $\sum_{n=0}^{\infty} c_n x^n$ has radius of convergence 3 then $\sum_{n=0}^{\infty} c_n x^{2n}$ has radius of convergence 9.

3. T/F (with justification)

   If $f(x) = 1 + 3x - 2x^2 + 5x^3 + \cdots$ for $|x| < 1$ then $f'''(0) = 30$.

4. T/F (with justification)

   The 2nd-degree Taylor polynomial at 0 for $\sqrt{1+x}$ is $1 + (1/2)x - (1/4)x^2$.

5. T/F (with justification): Doubling the radius of a sphere will double the surface area of the sphere.

6. T/F (with justification)

   The parametric curve $(\sin t, -\cos t)$ as t increases traces out a circle counter-clockwise.

7. T/F (with justification)

   On the parametric curve $(x, y) = (t^2 - 2t, t^3 - 3)$ the graph is increasing at the point where $t = 1/2$.

   T/F (with justification)

   Every point in the plane besides the origin can be written in polar coordinates (r, θ) with $r < 0$.

8. The fifth degree Taylor polynomial for $f(x) = \sin x$ centered at $a = 0$ is $1 + \frac{x^3}{3!} + \frac{x^5}{5!}$.

9. If the power series $\sum_{k=0}^{\infty} a_k(x-4)^k$ has a radius of convergence equal to 2 then $\sum_{k=0}^{\infty} a_k$ diverges.

10. Suppose the power series $\sum_{k=1}^{\infty} c_k(x-3)^k$ diverges at $x=0$ and converges at $x=5$. Which of the following are possible?

    a) The power series converges when $x=1$.
    b) The power series diverges when $x=2$.
    c) The radius of convergence is 3.

    ◯ 1) a and b
    ◯ 2) b and c
    ◯ 3) a and c
    ◯ 4) just one of a, b, or c
    ◯ 5) a, b, and c