The tests are cummulative and can include Pre-Calculus material mentioned in the MATH 2301 Calculus I handbook. This guide gives some sample questions for Sections 2.5, 2.6, 2.7, and 2.8. In some cases part of the problem is deciding which method to use, so you may be able to do the problem using methods from earlier sections. Doing these problems does not replace doing homework problems.

1. Compute the following derivatives:

   (a) $\dfrac{d}{dx}\left[(x^9+2x^{1/3}+x^5+3)^4\right] =$

   (b) $y=(3+x^4)^8x^3 \Rightarrow \dfrac{dy}{dx} =$

   (c) $\dfrac{d}{dx}\left[5\tan(x^2\sin(x^3+7x))\right] =$

   (d) $D_x\left[\left((x^9+x^8+x^5+3)(1+2x^2+x^3-4x^4)+1\right)^9\right] =$

2. Use implicit differentiation to find an equation for the tangent line to the curve defined by $x^2+4xy+y^2=13$ at the point $(1,2)$.

3. If $y=4x^3+x$ and $\dfrac{dx}{dt}=5$, find $\dfrac{dy}{dt}$ when $x=2$.

4. A kite 100 feet above the ground moves horizontally at a speed of 8 feet per second. At what rate is the angle between the string and the horizontal decreasing when 200 feet of string has been let out?

5. At noon, ship A is 100 km directly west of ship B. Ship A is sailing south at 35 km/hour and ship B is sailing north at 25 km/hour. How fast is the distance between the ships changing at 4:00pm? (Do not simplify your answer.)

6. The radius of a spherical cell is observed to decrease at a rate of 2 units/second when that radius is 30 units long. How fast is the volume of the cell decreasing at that point?

7. A trough is 10m long and its ends have the shape of isosceles triangles that are 3m across at the top and have a height of 1m. The trough is being filled with water at a rate of 12m^3/min. Draw and label a diagram illustrating this scenario. How fast is the water level rising when it is 0.5m deep?

8. The radius of a circular disk is given as 24 cm with a maximum error in measurement of 0.2 cm. Use differentials to estimate the maximum relative error in the calculated area of the disk.

9. Use a linear approximation (or differentials) to estimate $(8.03)^{2/3}$.